THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD



See You Through

 There are many good reasons why a Mack is your best truck investment during times like the present. Most important of all is the undisputed fact that Mack trucks outlast them all.

This means that with a Mack truck you can face the uncertainties of the future with assurance...confident that even if trucks should become hard to replace your Mack will see you through...that it will stay on the job delivering dependable service mile after mile and year after year.

Thousands of truck users in World War II found out by actual experience that they were indeed "Lucky to own a Mack." Whatever the future may bring, you'll find that for a sound investment in long-term reliability and operating economy there's no other truck to match a Mack.

Your nearest Mack branch or distributor will give you the full story on what "Built Like A Mack" means in extra long life, extra strength and stamina, extra performance and extra dependability.

These Model LISW Diesel Macks – awned by George M. Brewstor & Son, Inc., one of the country's larger contractors – are hauling directly from the quarry fine aggregate which will be used to make blacktop for the New Jersey Turnpike.

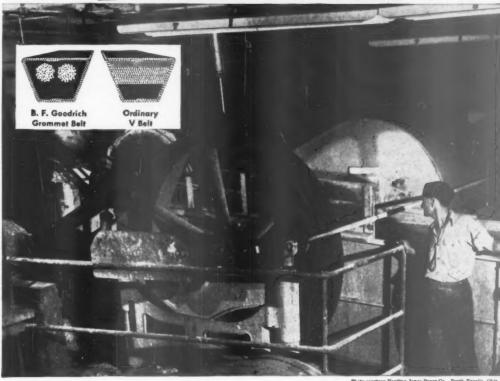


... outlast them all

Mack Trucks, Empire State Building, New York 1, N.Y. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N.Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



RESEARCH REEPS B.F. Goodrich FIRST IN RUBBER



Drive headache cured with **B. F. Goodrich grommet belts**

B. F. Goodrich grommet V belts cut costs 20 to 50%

HERE was one of the biggest drive problems in this plant. The machine shown in the picture runs 24 hours a day, 7 days a week. Belts previously used couldn't handle the job. Motor bearings were burning out, belts were snapping under the shock load.

Then a B. F. Goodrich distributor suggested grommet belts to stand the jerks and hard pulls. Installed nine months ago, B. F. Goodrich grommet belts are still going strong, and look good for many more months of use. Here's why BFG grommet belts give longer service, save maintenance costs:

Endless - A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures

Concentrated cord strength - All of the cord material in a B. F. Goodrich grommet belt is concentrated in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip - Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give

1/3 more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich makes the grommet! - No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. The B.F. Goodrich Company, Industrial & General Products Division, Akron, Obio.

Grommet Betts By

B.F. Goodrich RUBBER FOR INDUSTRY



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VOL. 54, No. 10

Bror Nordberg Editor

Nathan C. Rockwood Editorial Consultant

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Prestressed Concrete Conference Stresses Precast Units First United States conference emphasizes economy

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C. E. Wright

179

180



71-1530 Trailer with EUCLID



TRB-15D Trailer with GMC

P-1114 Trailer with FORD



BD-1118H Body with AUTOCAR



BP-1114 Body with STERLING

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ALL THREE new cement plants chose EASTON SIDE-DUMPS

All three of the new cement plants which will operate quarries in the United States (classified as under construction or definitely planned for 1951)*, have chosen EASTON Side-Dumps for quarry haulage.

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they were replacing other machines in their Linden Pits with Northwests. They have recently taken delivery on their sixth Northwest.

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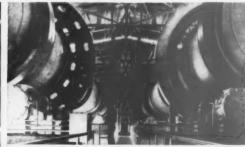
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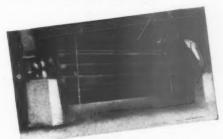
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PLUS

Exclusive operating principle of PMCO Impact Master delivers extra profit-making advantages

- Top capacity
- High ratio of reduction eliminates secondary crushers and auxiliary equipment. Provides a complete high output plant with minimum investment.
- 100% of the breaking is accomplished by rigidly mounted rotor hammers producing a better quality cubical aggregate.
- Better control over finished product size with simple mechanical adjustments changing the percentage of sizes.
- Less h.p. per ton of finished material.

Controlled Impact Action adds up to faster production, better production, more profitable production. PMCO Impact Masters are made with capacities up to 500 tph. Write for complete details.

HERE'S HOW

Adjustable feed plate (1) guides in-coming rock at proper angle into first rotor hammer circle (2). Infeed rock is intercepted in motion, exploded instantly by the terrific impact of the rotor hammers and simultaneously projected toward vertical screen grate (3) where finished sizes are immediately discharged.

Oversize particles are deflected upwards, intercepted by feed chute back plate (4) and guided downward into the path of the second rotor hammer circle (5) where they are exploded and projected toward the bottom half of the vertical screen grate and the lower screen grate (7) for immediate discharge.

Both rotor hammers rotate in the same direction toward the rear, promoting fast feeding and keeping

4700 West Division Street, Chicago 51, Illinois

all material flowing toward the discharge for top capacity.

Finished product sizes are controlled by the speed of the rotor hammers, and by simple adjustments (8) of stripper bar (6) and lower screen grate.

By controlling the in-fed rock and directing its flow, practically 100% of the breaking is accomplished by the rotor hammers. There is no attrition, no abrasive or grinding action. This reduces wear and makes possible a more uniform gradation cubical aggregate.

Phone SPaulding 2-9300



Before you buy any equipment for recovering dust or fly ash . . .



COMPARE ALL OTHERS

against MULTICLONE'S Multiple Advantages

Because the advantages of MULTICLONE are so clear-cut, so vitally important, so far-reaching in the savings they make, we urge you to make a factual unbiased comparison of MULTICLONE dust and fly ash collection equipment against any other in the mechanical recovery field. Only by making such a comparison can you fully appreciate the major savings and greater performance you get by installing MULTICLONE Collectors!

COMPARE Recovery Efficiency!

It is a recognised fact that the separating efficiency on of a cyclonic tube increases as the tube diameter decreases because smaller tubes generate greater centrifugal forces. The patented vane in the MULTICLONE makes the use of small tubes practical without complicated manifolding and permits com-pacting many small tubes into one simple, highly efficient unit. MULTICLONE's higher centrifugal forces throw out not only the large, medium and small particles, but also an unusually high percentage of the extremely small particles of 10 microns and less. Result—more complete recovery of all sus-pended particles from the gas stream?



COMPARE Space-Saving Compactness!

Plant space costs money—particularly at today's high construction costs. Because the Mulricuous is more compact, size for size, it makes really important savings in space and plant costs. Note in the chart how the Mulricuous requires substantially less space-both in floor space and cubic space

-than any other unit of comparable capacity and performance. This means vital sayings in construction costs!

Make	Space Requirements In Sq. Ft. In Cu. Ft.		
Multicione	1.0	1.0	
Collector A	2.1	1.8	
Collector B	5.9	3.2	
Calladas C	6.0	2.0	

COMPARE Dellar-Saving Adaptability!

Savings in space is just one of many ways MULTICLONE reduces installation costs. Because the shape of the unit can be readily varied (long and narrow, short and wide, or square) to fit available spaces, the MULTICLONE can often be tucked into odd corners and waste areas too restricted for nent.

Moreover, inlet-outlet ducts can be varied—side-inlet side-outlet, or side-inlet top-outlet—to meet low headroom or restricted side clearance requirements...and the single-inlet singleoutlet duct design permits greater flexoutlet duct design permiss greater and biblity and simpler installation. These Side inlet, Side inlet, all add up to vital savings in installa
Side outlet Top outlet



COMPARE All-Around Simplicity!

The MULTICLONE is simple and inexpensive to maintain because there are no highspeed moving parts to repair or replace... no pads or filters to clean or renew... nothing to choke the gas flow or increase draft losses as suspended materials are recovered.

In addition, the square, flat-sided Conventional shape of the MULTICLONE and its straight inlet and outlet duc's are far simpler to install and insulate. And aince the recovered material from an entire bank of tubes is collected in a single hopper, it is much easier to serv ice and maintain than the multiple hoppers of conventional cyclone units. Here again, the MULTICLONE saves in any waysall of them important!



Cyclone

Multiclone

Whether your recovery installation is in a new structure or for modernizing present equipment, you will be far ahead by installing MULTICLONE Collectors. Our experienced engineers will gladly make helpful suggestions for simplifying your recovery problems. A letter, wire or call to our nearest office places this asistance at your service without obligation.



Send for Helpful Literature! This factual MULTICLONE literature explains the basic principles of cyclonic dust recovery and gives technical data helpful to anyone contemplating a dust or fly ash recovery installation. Write today for your free copy!



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The Wallace Stone Co. plant at Bay Port, Michigan, is 180%, "Cat" powered. A "Caterpiller" Diesel D13008 Engles powers Gerdner-Dever 356-cu-1t. portable compressor, furnishing air to wegon drill at the querry. Production: 200 tons of crushed limestone per hour. Owner: Wallace Stone Co., Bay Port, Michigan.

THE PRESSURE'S ON! Our country is under way in a tremendous defense effort—and everyone has a job to do. Yours is important. Military and civilian needs call for an estimated 58 billion tons of limestone, cement rock, crushed stone, sand and gravel this year. And as much or more, next year!

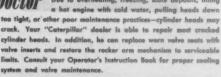
It's going to be a long pull for men and machines. Will your equipment stand up? Much of it must! Military and Defense Rated Orders must be filled first, so obtaining new machines may take longer than you had planned. But you can easily help yourself to many extra hours of equipment life!

How? If you have "Caterpillar" Diesel Engines, Tractors, Motor Graders or Earthmoving Equipment, you're in a good spot. These units are rugged—and you've got a live-wire partner in your "Caterpillar" dealer. Anticipate your replacement parts needs before parts are worn beyond repair. Talk these needs over with him. He is qualified to give competent opinion. If he can't replace, he may be able to rebuild the original part. He has a top-notch service staff and facilities. He'll do his utmost to keep your equipment on the job!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



You're the Doctor Due to everheating, freezing, scale deposits, filling a had energy with cold water, pulling heads down



REREAD YOUR OPERATOR'S ENSTRUCTION BOOK Good care can add many extra hours of equipment life.



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performance.

It is fuel-thrifty because the gradual speed regulator adapts engine speed to air demands, also minimizing engine wear and reducing maintenance.

Other features of this two-stage, air-cooled compressor include pressure lubrication, large Simplate valves and selfadjusting clutch.

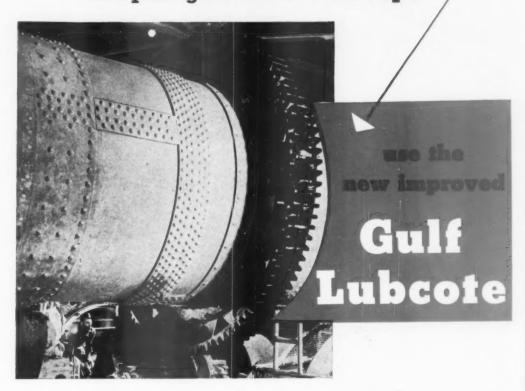
CP Portable Compressors are available in gasoline-driven models from 60 to 315 cfm actual capacity, and in Dieseldriven models from 105 to 600 cfm capacity.

Write for detailed information.



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of open gears and wire rope



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And since its lubricating film is resistant to moisture, fumes, and gases, it prevents corrosion and pitting of metal surfaces. The tough Gulf Lubcote film also withstands extreme temperature changes without drying, cracking, or peeling.

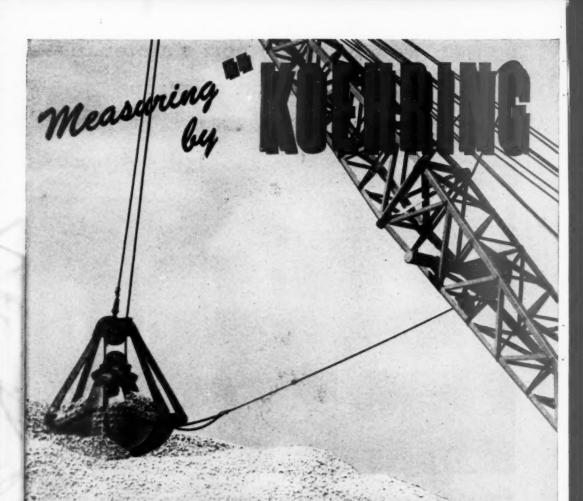
Gulf Lubcote is ideal for noisy open-gear drives—cushions the sliding and rolling action of gear teeth, reducing noise and contributing to worker efficiency.

A Grade for Every Duty

Gulf Lubcote is available in a range of viscosities and consistencies. Selection of the proper grade depends on type of equipment, operating conditions, and method of application. Ask a Gulf Lubrication Engineer for his recommendation. Or send the coupon below for further information.

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These extra qualities are MORE than worth every penny they cost.

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has made an impressive name over the years ... one company owns nearly 40 of these machines ... and another has 30! MARION is proud of the 4161 and its record... and stands behind this and every other machine that bears the MARION name.

We build good shovels and we back up every MARION owner only for one reason... it's the best way to give you more for your money... both for today and over the years.

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The Peak Day's Production Co. at Concrete Materials & Construction Average Daily Production -Average Daily PER HOUR!

THIS CEDARAPIDS DOUBLE IMPELLER IMPACT BREAKER

is really turning out the tonnage! On their New Jersey Turnpike contract, Concrete Materials & Construction Co. put through 14,472 tons of aggregate... 800 truck loads, at 16 to 20 tons per load... on their peak day, a 20-hour period when the surge pile was down and plenty of trucks were available for feed. That's a 724 ton per hour peak production average!

Originally scheduled to turn out around 400 tons per hour, the 5050 Double Impeller Impact Breaker in this Concrete Materials plant is consistently averaging more than 600 tons per hour. No wonder more and more contractors are depending on the bonus production of Cedarapids Double Impellers!

To meet today's demand for AGGREGATE UNLIMITED, and assure yourself of opportunity unlimited for profit, see your Cedarapids distributor today for the equipment you need to make your plant a real producer.



DOUBLE IMPELLER IMPACT BREAKERS

Get ready for the big jobs with a Cedarapids Double Impeller Impact Breaker in your plant. It's your assurance of maximum output of the cubical shaped aggregate required in so many specifications today. Because so much of the material is broken in suspension, you get an extremely high ratio of reduction at extremely low power costs. Exceptional tonnage with a minimum of connected horsepower! And you save on your plant set-up because you can eliminate much accessory equipment such as secondary crushers, conveyors, etc. You can get immediate delivery on Double Impeller Impact Breakers to give you OPPORTUNITY UNLIMITED right now! Four sizes available.

THE IOWA LINE of Material Handling Equipment Includes: BOCK AND GRAVEL CRUSHERS of BELT CONVEYORS of STEEL BINS of VIBRATOR AND REVOLVING SCREENS of UNITIZED ROCK AND GRAVEL FLANTS of PREDERS of PORTABLE POWER CONVEYORS of PORTABLE AND STATIONARY STONE, GRAVEL AND SAND PLANTS of REDUCTION CRUSHERS of BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS of BRIERS of DUST COLLECTORS HAMMERMILLS of WASHING PLANTS of VIBRATING SOIL COMPACTION UNITS of DOUBLE IMPELLER IMPACT BRIERERS

IN IN ITED for the New Jersey Turnpike



IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U.S.A.

if you have a BIG SCALE cement slurry storage job



to the problem of large volume kiln feed storage required in today's wet-process cement production. Here are several reasons why . . .

First, because it is powered by the Type H drive from which it takes its name...a rugged power-package incorporating balanced spur gears and extra-heavy duty construction.

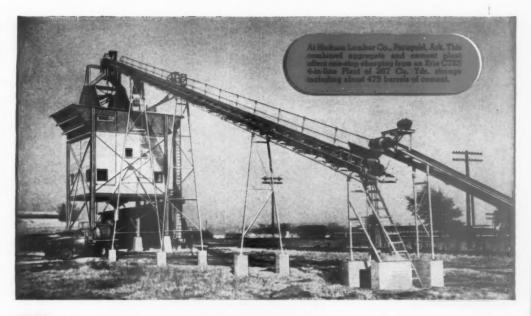
Second, because it utilizes a center shaft mechanism with the drive head supported by a truss spanning the tank. This requires no center pier and foundation...saves concrete and reinforcing steel... greatly simplifies the construction of deep tanks as required for cement slurry mixing. In short—saves dollars for you.

Add to these features the thoroughly proven mixing control effected through the rake and air lift principle of the Dorr Slurry Mixer. The result is the best possible slurry storage unit in the 45' to 70' dia, range—at a reasonable installed cost. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street West, Toronto 1.





THE DORR COMPANY - ENGINEERS - STAMFORD, CONN.
Offices, Associated Companies or Representatives in the principal cities of the world

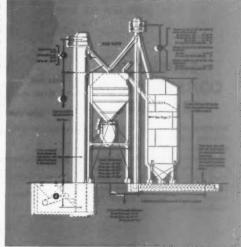


ERIE C-S SERIES Combination BINS Offer 10 Compartment Arrangements

These Combination Aggregate and Cement Bins are of the knock-down semi-portable type. We build them in standard sizes with either 3 or 4 compartments in line. To meet special storage conditions we also build C-S Combination bins in 10 different top partition arrangements that provide almost any degree of material classification.

The advantage of having up to 475 barrels of cement alongside aggregates in one bin makes for economy and fast one-stop charging of materials. Auxiliary connected cement storage may be provided by the addition of Ground Storage Bins.

For extra high truck clearance required of large Central Mixing Plants or Concrete Products Plants 11 ft. additional column height, over the standard 20 1/3 feet, is available.



Arrangement of Erie C-S Series Combination Cement and Aggregate Bin with auxiliary Erie Silo-type ground storage of cement interconnected to main plant.

WRITE FOR BULLETIN C-S



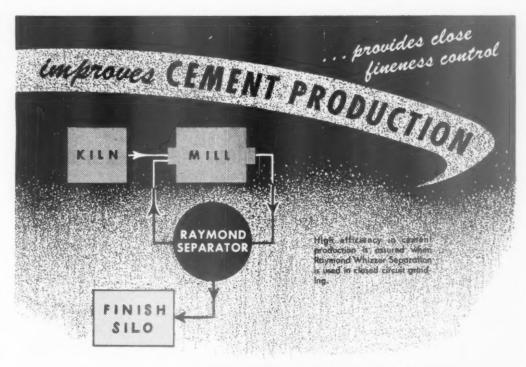
T. John Company

721 GEIST ROAD . ERIE, PENNSYLVANIA





COMBUSTION ENGINEERING



Raymond Whizzer Separation has proved outstandingly successful in the cement field for classifying both raw cement mix and cement clinker.

Close control is assured over the specific surface area of the finished cement and consistent finished materials are made at any surface area specification. With the proper setting of the separator it may be adjusted externally while in operation for any required surface area specification.

The overall economy of Raymond Separators is due to minimum power requirements with record low operating and maintenance costs . . . plus greatly increased grinding mill capacity.

Write for Raymond CATALOG No. 58

containing full deterts of Raymond Mechanical Air Separators, and their applications in making cement, gypsum, chemicals and manufactured products.

- SUPERHEATER, INC.

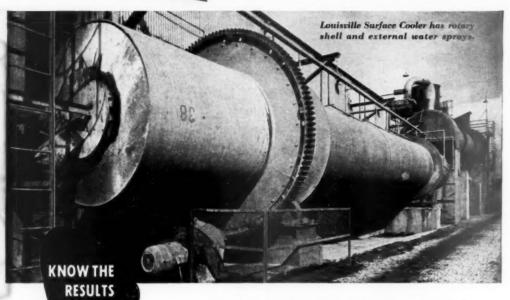
1307 North Branch St., Chicago 22, Illinois

Sales Offices in Principal Cities



CREATIVE COOLING ENGINEERING

Louisville Cooler does satisfactory job at low cost for nationally known chemical manufacturer...



3 types of Louisville Coolers

before you buy!

- Surface Cooler
- Water Tube Cooler
- Atmospheric Cooler

... cooling lumpy calcined material from 1800° Fahr. to 150° Fahr. for further processing. Gentle mechanical handling required to minimize decrepitation.

Each Louisville cooler is "job-fitted" to your special problem—to make your cooling operations effective—to assure dependability of performance that will make the cooler operation pay.

Call in a Louisville engineer for a complete cooling survey. Based on his experience he will recommend one of the three standard Louisville types, a modification, or an entirely new design. The performance will be pre-determined. You'll know the results before you buy . . . and the results must be better! Write for complete information today.



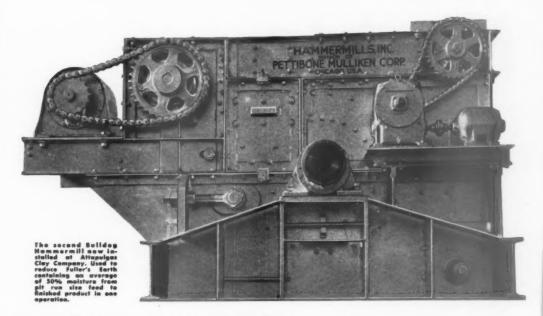
Louisville Drying Machinery Unit Over 50 years of creative drying engineering

GENERAL AMERICAN TRANSPORTATION CORPORATION

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Other General American Equipment:

Turbo-Mixers, Evaporators, Thickeners, Dryers, Dewaterers, Towers, Tanks, Bins, Filters, Kilns, Pressure Vessels



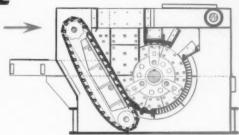
BULLDOG HAMMERMILL

with Moving Breaker Plate

For wet, sticky material reduction . . . for those tough, heavy-duty crushing jobs.

Illustrated above is the last word in Moving Breaker Plate Hammermill design. It is built by an engineering organization whose experience far surpasses any organization that might furnish Moving Breaker Plate crushing equipment.

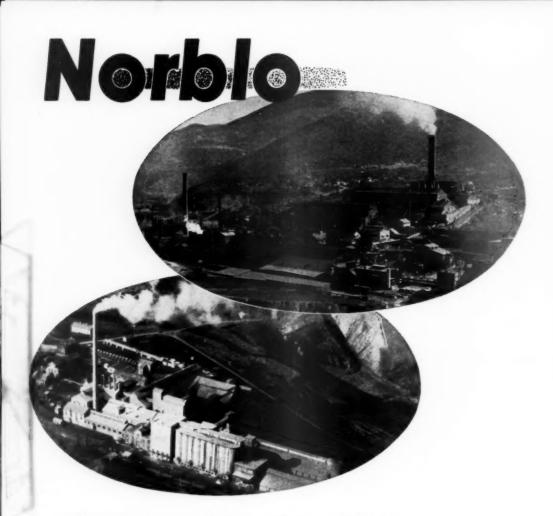
Design Improvements have increased reduction efficiencies and lowered H.P. requirements. You can see this equipment in operation at any time. Also Hammermills will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.



Buildog Hammermills are built in capacities up to 1000 tons per hour for every purposes for primary, secondary, fine reduction of materials such as limestone, shale, Fuller's Earth, phosphate muck, phosphate mud balls, iron ore, syster and clam shells, any reducible material.

HAMMERMILLS, INC., division of PETTIBONE MULLIKEN CORPORATION
4770 W. Division St.
Chicago 51, Illinois Phone Spaulding 2-9300





Efficient, Economical Dust and Fume Collection...

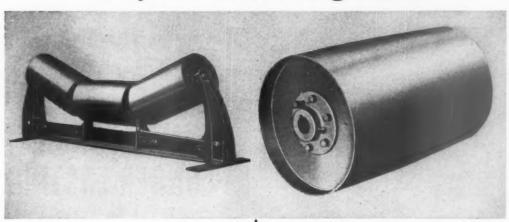
78 cylindrical bags, totalling 936 square feet of free cloth area are the basic unit of Norblo Automatic Bag Type Dust Collectors. Bag cleaning, one unit at a time, takes only a few seconds, the air flow being reversed during the shaking. Thus Norblo operates continuously at full rated capacity of the cloth area. Timing can be adjusted to dust load changes without shutting down.

Norblo automatic dust and fume collection systems are built for continuous heavy duty service at low cost. Maintenance is simple. More than 30 years of experience in cement and rock products, mining and smelting are assurance of dependable star performance. Write for Bulletin 164-2.

THE NORTHERN BLOWER COMPANY

Engineered Dust Collection Systems for All Industries
6408 BARBERTON AVE. • CLEVELAND 2, OHIO

How Belt Conveyors by LINK-BELT cut your handling costs



LINK-BELT Idlers require minimum lubrication and adjustment

BY MINIMIZING maintenance . . . holding "down-time" to a new low . . . reducing power requirements — Link-Belt Roller Bearing Idlers save you money.

And, because of standardized design, Link-Belt gives you the famous "100" Idler or the heavy-duty "200" Idler at a cost lower than you'd expect. You can choose from the full Link-Belt line of troughing, impact-cushioning, belt training and flat belt idlers in a wide range of roll diameters and belt widths. A complete line to meet any requirement.

Grease-in dirt-out, cartridge type unit seal preserves lubricant. No springs, no loose parts, no sliding metal-to-metal contact.

Large grease reservoir prolongs lubrication intervals.

Precision roller bearings maintain alignment.

Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.



LINK-BELT Welded Steel Pulleys minimize shaft deflection

MODERN Link-Belt welded steel design gives you lower maintenance and longer pulley life in more ways than one. Water- and dust-tight construction preserves balance, halts corrosion. Removable hubs—key-seated in line with two set-screws—are interchangeable with many other shaft sizes.

And for reducing shaft deflection (see below), you can't possibly get better protection than with Link-Belt Welded Steel Pulleys.

Since shaft bending moment increases in proportion to the distance between shaft bearing and pulley hub, it's easy to see why Link-Belt Welded Steel Pulleys are your best bet. Note how the bearing support and hub of the pulley are mounted with medium clearance. That's possible because Link-Belt hubs are flush with the pulley face.

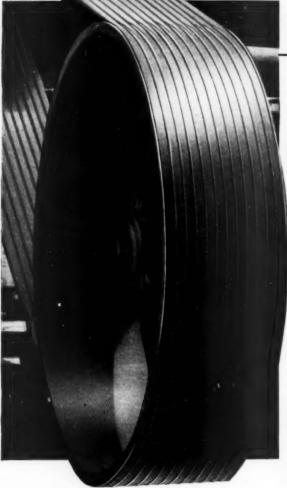


BELT CONVEYORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.



Maintenance, Production, Purchasing and Front Office can see Eye to Eye on this "Baby"





TOUGH PROBLEMS INVITED!

Ask us or your nearest BWH distributor about your power transmission betting, conveyor betting or hose problems. We're specialists in making mechanical rubber products work better, longer.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER CO.

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. . P.O.BOX 1071, BOSTON 3, MASS., U.S. A.



Yes, a Bull Dog V-Belt has something for everybody. Your engineers and production heads who have enough on their minds already with shortages and the necessity for increased output will appreciate the SPECIALLY ENGINEERED BWH CORD SECTION and its high tensile strength. They'll get the superior load carrying capacity from BULL DOGS and the ability to absorb shock loads that's needed.

Your maintenance men (engineers, too) will note the QUALITY CONTROLLED COM-POUNDS developed by BWH which run cooler and do not crack or deteriorate under severe flexing. They'll probably note also the MIN-IMUM STRETCH—due to a new and exclusive technique in processing Bull Dog Cords. They'll be sure to note the less slippage, fewer adjustments, longer belt life that results.

Your maintenance men will also okay the Bull Dog V-Belt's DURABLE COVERS. They're made of closely woven, heavy, bias-cut fabric that takes the torturous wearing action where the belt meets the sheave — seals it against the penetration of dirt, grease and moisture.

With it all adding up to less money out in belt repairs and replacements and more money in from maintained and increased production . . . don't you think Purchasing and the Front Office will be glad to go along?

Their first LINK-BELT SPEEDER sold them 15 more!



For 30 years... BLUE DIAMOND CORP.

has standardized on LINK-BELT SPEEDERS

LINK-BELT SPEEDER

From the early 20's when they started in business with their first Link-Belt Speeder, the Blue Diamond Corporation (home office, Los Angeles, Cal.), has

made steady progress. Today they are rated one of the country's largest producers of basic materials and manufacturers of wall board.

To keep pace with this progress, more and more Link-Belt Speeders have been put into service to handle this ever-increasing volume. High praise for the remarkable freedom from adjustment and down time, so characteristic of Link-Belt Speeders.



Electric-powered Link-Belt Speeder heavy-duty shovels at work in a gravel deposit.



Crawler mounted Link-Belt Speeders filling a Redi-Mix concrete



Self-propelled, rubber-tired Link-Belt Speeders used for aggregate

LINK-BELT SPEEDER

CORPORATION

Builders of the most complete line of shovels, cranes and draglines CEDAR RAPIDS, IOWA



UNIVERSAL 293QS TwinDual Gravel King for big jobs requiring volume production. Three stages of crushing, two screens.

LOW TONNAGE



UNIVERSAL Model GA Portable Jaw Crushing Unit. A complete selfcontained plant for many small crushing jobs.

MEET ANY TONNAGE REQUIREMENT WITH UNIVERSAL STANDARD PLANTS

High tonnage, low tonnage—for any type of aggregate from riprap to aglime, or road ballast to washed sand—you can depend on Universal to meet your production requirements.

The wide range of cost-cutting, field-proved Universal standard plants permits selection of the right equipment without special built-to-order expense. Whether your jobs are big, medium, or small, Universal builds the plant you want for low cost production. Ask your Universal distributor or write for illustrated literature.

The most complete line of Portable, Semi-Portable, and Stationary Crushing, Screening, Loading and Washing Equipment.

- Rock Plants
- Gravel Plants
- Aglime Plants
- Crushing Plants
- · Cool Plants
- Screening Plants
- Washing Plants
- Loading Plants

UNIVERSAL ENGINEERING CORPORATION Division of PETTIBONE MULLIKEN CORPORATION

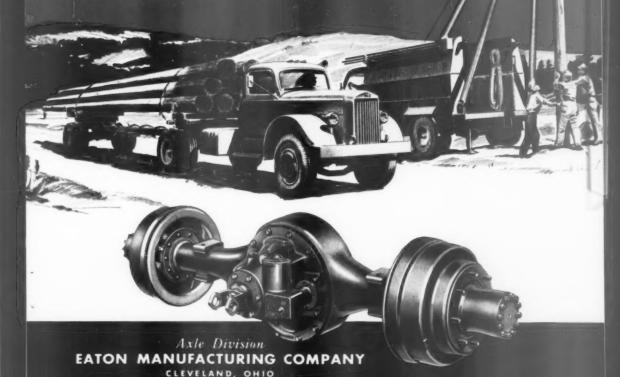
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On the Highway or Off— Trucks Go Faster at Lower Cost

Eaton 2-Speed Axles enable your trucks to go where they have to go to do the job—without damaging strain on engine and power-transmitting parts. They add to the performance of your vehicles, enable them to cover more payload miles in less time, at lower over-all cost. The experience of thousands of users proves that Eaton 2-Speed Axles and Eaton-equipped trucks last longer. Your truck dealer will explain how such outstanding Eaton features as planetary gearing and forced-flow lubrication add thousands of miles to axle life, save maintenance cost, reduce time-in-the-shop.

EATON AXLES



PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES . TAPPETS . HYDRAULIC VALVE LIFTERS . VALVE SEAT INSERTS . JET ENGINE
FARTS . ROTOR PUMPS . MOTOR TRUCK AXLES . PERMANENT MOLD GRAY IRON CASTINGS . HEATER DEPROSTER UNITS . SNAP RINGS
SPRINGTITES . SPRING WASHERS . COLD DRAWN STEEL . STAMPINGS . LEAF AND COIL SPRINGS . DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS



No Wear

HANDLING FLORIDA SAND mixed with rutile, ilmenite, zircon and monazite will grind any metal pump to pieces in short order. But this Allis-Chalmers rubber lined pump has been operating for more than a year with no measurable wear. 10 to 50 times the service life of the best metal alloy pumps is not an uncommon record.

Special Compounds Used

Rubber lining compounds are especially engineered for each application. Linings are bonded to steel frames and not to the pump body. Linings may be replaced without removing the pump from its location. The impeller is equally easy to remove and replace.

If you are pumping fine mesh, hard, abrasive materials (1/6" to 325 mesh size), you may find that an Allis-Chalmers SRL rubbed lined pump will mean longer life and lower costs per gallon pumped. Ask your nearby Allis-Chalmers District Office representative, or write Allis-Chalmers, Milwaukee 1, Wis, and ask for Bulletin 08B7311.

4.2474

ALLIS-CHALMERS





Sales representatives in all parts of the U.S.A. FOR/CANADA: Canadian

Bridge Engineering Compu Ud., Walkerville, Ontario FOR EXPORT: Brown and Sites, 50 Church/Street, Ne York 7, N. Y.

ENGINEERING COMPANY . DURAND, MICHIGAN



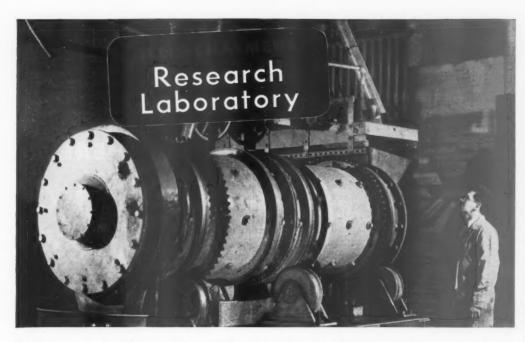
BUCYRUS-ERIE EXTRA VALUES MEAN

Dependable High Output Big, dependable yardages are "standard equipment" for Bucyrus-Erie excavators, as owners and operators the world over will testify. The superior performance reords of Bucyrus-Erie result from fast, smooth operating cycles and on-the-job reliability for peak output every shift . . . plus the extra values of soundly engineered design and durable construction available only to Bucyrus-Erie as a result of its unmatched experience in the construction of quality excavating machinery.

142151



SOUTH MILWAUKEE, WISCONSIN



How Lab Tests Reduced Initial Plant Cost

A PROCESSOR wanted to find a low cost method of crushing and dry grinding lead slag to a carefully controlled product of 98% passing 10 mesh. A method had been worked out previously which would meet these size specifications but which required a considerable amount of costly auxiliary equip-

ment. The customer hoped that a simpler method might be found.

A 20-ton sample was sent to the Allis-Chalmers Research Laboratories for a pilot plant test run. Proper operating conditions were established, and it was proved that the required reduction could be achieved by open circuit dry grinding in an end peripheral discharge rod mill with no auxiliary equipment.

As a result of the Laboratory tests, this company was able to save money on the original plant investment. Simplified plant layout also resulted in low maintenance.

CAN YOU USE THESE FACILITIES?

The Allis-Chalmers Processing Laboratory was established to help you work out profitable solutions to processing problems. It contains modern equipment for batch and pilot mill tests in grinding, crushing, sizing, concentrating, pyro-processing, chemical and physical analysis.

The Laboratory's purpose is to develop new or more efficient processing methods...to determine the economics of a process prior to full-scale operation . . . to provide engineering information to guide in designing efficient plants . . . for virtually any type of industry.

Facilities of the Laboratory are available to anyone in industry. Charges are based on costs. Estimates for test work can be obtained from A-C district offices or from Allis-Chalmers Processing Laboratory, Milwaukee 1, Wisconsin.

Send For Your Copy Today

Laboratory Bulletin 07B6419B

Allis-Chalmers Mfg. Co. Milwaukee 1, Wis.

Name

Position

Address

City State

ALLIS-CHALMERS

Processing Research Laboratory — Dedicated to a Better Utilization of our Raw Materials

Speed-Power-Guts- 25

Lorain TL-25 machines have all of these important profit-making qualities . . . SPEED — responsive clutches and rapid acceleration save seconds per trip, and more trips per day mean more yardage . . . POWER — abundant power from a "plus" engine is delivered by a high-efficiency transmission to just where you want it, when you want it . . . GUTS — if you mean ability to take punishment and to hang-on relentlessly until the job is done, "TL-25's" have it . . . or if you mean the "insides" of the machine, "TL-25's" again have it in advanced design and construction that give you these features . . .

• IT'S A COMPLETE PACKAGE—NO EXTRAS TO BUY • INTERCHANGE-ABLE "PACKAGED" COMPONENTS—FAST, EASY TO SERVICE • 5 IDENTICAL CLUTCHES • ONE-PIECE BED • OIL-ENCLOSED CUT GEARS • INTERCHANGE-ABLE PARTS • ANTI-FRICTION BEARINGS • HOOK ROLLERS • QUIET, SMOOTH OPERATION • 7 MODELS TO CHOOSE FROM—3 CRAWLERS (STD., EXTRALONG OR EXTRA-WIDE) AND 4 RUBBER-TIRE MOUNTINGS

Your nearest Thew-Lorain Distributor can show you these TL-25 features at work!

THE THEW SHOVEL CO., LORAIN, OHIO

HERE'S

3/4

YARDS

OF THEM!

QUALITY LIMESTONE CO., Marshall, Illinois load out trucks at a fast rate with their Lorain TL-25-J shovel.

THEW

LORAIN

on CRAWLER or RUBBER

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PRIMACORD produces a powerful detonating wave which travels at approximately 4 miles per second throughout its length. It acts as the detonating agent for all holes in the shot.

The infinitesimal time lag between holes and rows of holes permits planned rotation firing, relieves burden. The powerful detonation of each portion of each charge produces more work from your explosives.

Primacord is insensitive to stray electrical currents — cannot be set off by friction, sparks or ordinary shock.

Add to this the ease of handling, simplicity of hookup, and high tensile strength . . . you'll see why it is the almost universal choice of pit and quarry men.



REINFORCED PRIMACORD. Depend on it for use in deep holes where extra tensile strength (160 lbs.) or resistance to abrasion are desirable. Tough, but resilient and easy to handle, it is gaining in popularity for general use. 1000-foot spool weighs 20 lbs.; tensile strength 160 lbs.

Users of Primacord agree that there is no substitute for its general excellence. Consult your explosives supplier for complete information, or write to us direct.



WIRE COUNTERED PRIMACORD. Armored with closely stranded brass wire, Wire Countered Primacord is the answer where deep, ragged holes and high abrasive conditions are encountered. The wire sheath increases tensile strength to 220 lbs. Weight per 1000-foot spool is 35 lbs.



PLASTIC REINFORCED PRIMACORD. Use it for extremely deep, wet holes, river crossings, or wherever water is a problem. It is also resistant to acids commonly encountered. Although Plastic Reinforced Primacord weighs only 22 lbs. per 1000-foot spool, its tensile strength is 250 lbs.



PLAIN PRIMACORD. For shallow holes, surface trunkline use and other applications where abrasive and other rugged conditions are not considerations. 1000-foot spool weighs 19 lbs., tensile strength 113 lbs.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut

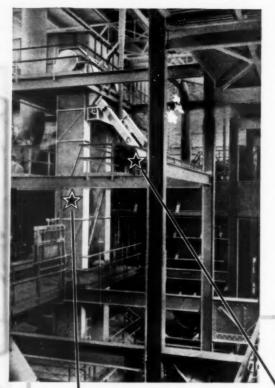
PRIMACORD-BICKFORD

Also Ensign-Bickford Safety Fuse - Since 1836

DETONATING FUSE

MATCH YOUR JOB of Materials Handling...

with LINK-BELT Bucket Elevators and Screw Conveyors



LINK-BELT offers you the most diversified line of both . . . plus wide engineering experience

MOVE bulk materials with top efficiency. Choose your bucket elevators and screw conveyors from the complete Link-Belt line . . . engineered to meet your exact requirements.

For maximum results — different materials and varying conditions require specific types of materials handling equipment. That's why Link-Belt builds many types and sizes of enclosed conveying equipment . . . the widest range of bucket elevators and screw conveyors.

When you need bucket elevators or screw conveyors . . . choose them from the most diversified quality line on the market. Call in Link-Belt, the world's leading manufacturer of elevating and conveying machinery.



Steel-encased continuous Link-Belt Bucket Elevators deliver smooth flow of white-run and dark-run gypsum to Link-Belt Helicoid Screw Conveyors feeding surge bins in wallboard plant.



Continuous bucket elevator delivers high capacities at lower speeds.



Helicoid or Sectional Conveyor Screws—for general screw conveyor applications, — may also be furnished in the metal and finish best suited to your purpose and with components selected from the most complete line.



BUCKET ELEVATORS AND SCREW CONVEYORS

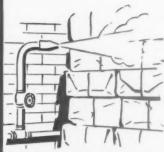
LINK-BELT COMPANY: Chicago 8. Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in Principal Cities.

NO. 1 OF A SERIES

Stretch a MULTIWALL Paper Bag

Kraft paper supplies are short. So it is important for you to get the best use from your multiwalls. Here is one way to stretch them...

Keep Storage Rooms Humid:



Let steam escape in bag storage room to keep air and bags humid. Keep a humidity indicator in the storage room and check it frequently. Always leave aisles or spaces between stacks of bags to allow circulation.



Store bags on dunnage, away from floor, and keep floor wet so moisture can be absorbed into air. A relative humidity of about 50% at warm temperature is best.



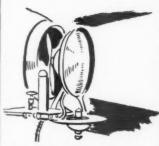
Drill small "needle" holes in horizontal water pipes. Hang cloths over holes. Air absorbs moisture from wet cloths,



Hang wet cloths over edge of water barrels. Cloth absorbs water and air absorbs moisture from cloth. Keep barrels well filled.



Open windows on damp or rainy day. Damp outside air will circulate in the bag storage room. Multiwalls are strongest when moisture content of the paper is about 6 or 7%.



Use commercial humidifying apparatus. Many types of commercial humidifiers are available with capacities to suit individual requirements.

Want the Whole Story?

Ask your Bemis Man for free, illustrated copy of Bemis Multiwall Packaging Guide. It deals with Storage, Filling and Closing, Handling, Palletizing and other important subjects.

Maybe Cotton Bags are Your Answer . . . if you can't get all of the multi-walls you need. Cotton bags are available . . . and Benis is the leading cotton bag source.





THE DEMPSTER.DIGGSTER. Type GRD, same as the one that loaded 600 tons of stone recently, has a 15 foot six inch turning radius, is 20 feet long when bucket is in traveling position, and bottom of bucket

is nine feet three inches above ground when in extreme dumping position. It will dig 15 inches below grade and through a 15 footbank.



THIS DEMPSTER-DIGGSTER, Type HL, is specially equipped for high dumping. The bottom of the bucket is 13 feet six inches above ground. It will dig through an 18 foot bank.



FOR FAST, EFFICIENT operation in difficult terrain, the Dempster-Diggster is available with crawler-type traction.

Fast Automotive Shovel Loads 600 Tons of Stone in Half a Day

CONTRACTOR REPORTS: HYDRAULIC CROWD, HOIST UNIT "FILLS LONG NEEDED PLACE IN OUR INDUSTRY"

THE DEMPSTER-DIGGSTER, a revolutionary shovel loader, recently loaded 600 tons of broken stone in the first half day of operation. This outstanding performance was reported to Dempster Brothers, Inc. by W. E. Lambert, president of Lambert Brothers, Inc., one of the nation's largest crushed stone contracting firms.

"In connection with our extensive activities in several southern states," the contractor said, "we have used various types of power shovels and front end loaders. After seeing the easy operation of the hydraulically operated Diggster in a demonstration we had made along-side of a competing loader, we placed an order with you. We installed the Diggster equipped with a yard and half stockpile bucket on one of our operations in western North Carolina.

"Our records show," he continued, "that the unit loaded approximately 600 tons of broken stone in the first half day of operation. The Diggster has been working continuously and is giving perfect satisfaction. It is a pleasure for us to so advise you because in our opinion the Diggster fills a long needed place in our industry. We welcome you to bring

any interested parties to our operation to see the Diggster in action."

The tremendous speed of the Dempster-Diggster in excavation and stockpile work is accounted for, mainly, by its exclusive independent hydraulic crowd and hoist action, the hydraulic steering, and wheel-type traction, which permits truck speeds to and from jobs. The power crowd permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver easy, fast, finger-tip control.

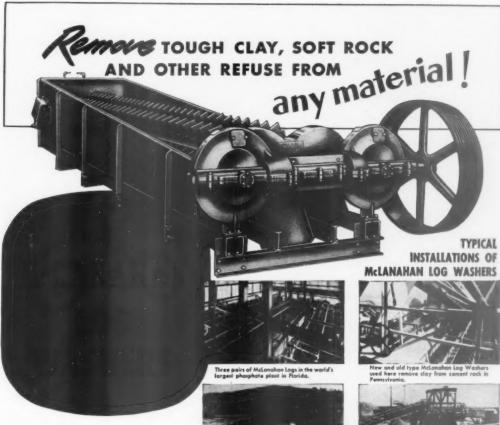
Four standard interchangeable buckets of two types are available. Digging buckets with four bottom teeth in 1 and 1¼ cubic yard (heaped) capacities; materials handling buckets in 1½ and 2 cubic yard (struck) capacities.

Complete information and prices may be obtained by writing the manufacturer, Dempster Brothers, Inc.

> Dempster Digester

DEMPSTER BROTHERS

3 N. Knox Knoxville 17, Tennessee



McLanahan Welded Steel Log Washers are smooth running, highly efficient machines for removing tough clays, soft rock and other materials from iron and manganese ores, barytes, zinc, ochre, peat, limestone, trap rock, sand and gravel, phosphate, gold and other ores. These machines remove up to 90% of refuse materials—providing savings that more than pay for the installation in a short time. A few of hundreds of applications are illustrated at right.



Write today for Bulletin WLO 849



Two pairs of 30' McLanahan Lags, used for cleaning sand and gravel in Virginia.



McLanahan Paddle Mill and Log Washer cleaning Texas limestone.

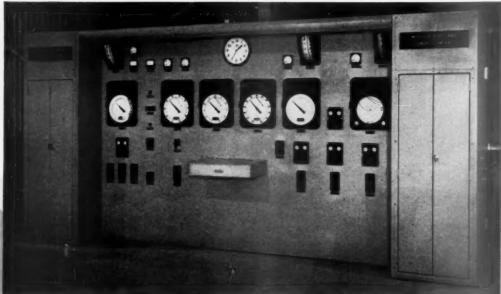




MCLANAHAN & STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Rell—and Jaw Crushors, Cruching Plants, Reciprocating Plate and Apron Feeders, Rell Grizziles, Conveyors, Elevators, Screams, Scrubbers, Steel Log Washers, Sand Drags, Holsts, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Spreckets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Forrous and Bronze Castings.



Main Panel Board for control of 3000 bbl per day Kiln at Missouri Portland Cement Company, St. Louis, Missouri.

3 Ways Better

...Bailey Control for Rotary Kilns

Bailey Control for Rotary Kilns gives you better performance three ways:

- 1. Economical Operation
- 2. Uniform Quality of Product
- 3. Reduced Maintenance

These are advantages which can be achieved when all phases of kiln operation are coordinated to work together as a team. Here's how Bailey Kiln Control can help you get all three.

ECONOMICAL OPERATION

With Bailey Combustion Control you can be certain that you are getting maximum product for every unit of fuel you burn. Bailey Control closely guards the Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and the Temperature of Air for Combustion.

UNIFORM QUALITY OF PRODUCT

Bailey Instruments and Controls can help you achieve a

uniform high grade product. Measurements of temperatures, kiln speed, combustibles content, and oxygen content can be transmitted to recorders on centrally located control boards like the one shown. There is no sacrifice of accuracy or speed of response. High temperature alarm contacts may also be provided with Bailey Pyrometers as a further aid in achieving optimum uniformity of product.

REDUCED MAINTENANCE

By maintaining uniform temperatures and excess air conditions in the kiln, Bailey Controls help to reduce to a minimum costly refractory repairs and wear and tear on auxiliary equipment.

Bailey Meter Company has a staff of engineers who are experts in the control of rotary kilns. Assure yourself of optimum kiln performance. Let one of these men help plan your Kiln Control System.

BAILEY METER COMPANY

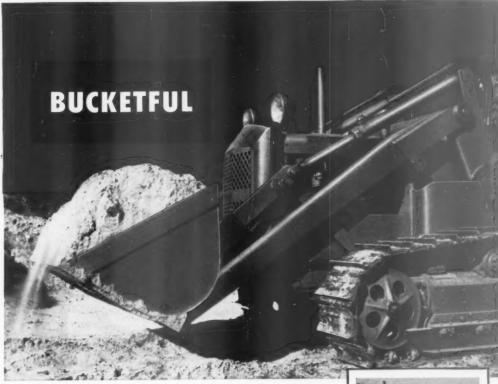
1039 IVANHOE ROAD

CLEVELAND 10 OHIO

Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
% COMBUSTION

FLOW LEVEL DENSITY RATIO



of Cost-Cutting Features

When it comes to cutting loading costs...stepping up profits, the Oliver Model "B" Crawler and Ware Loader is "loaded" with plus features.

Take the hydraulically controlled bucket, for example. 110° bucket rotation and 28° "tilt back" give you a full bucket every time. "Breaking out" action is 3 times the lifting effort of the loader ... a particularly important advantage when loading out hardpacked material or for stripping operations. Bucket level is automatically maintained when lifting load, preventing wasteful spillage. You can control speed of discharge . . . fast or slow, easily and gently. And, even with the "tilt back" action, you still have a 32° (from vertical) dump angle . . . a control range no other

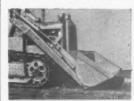
loader can match. You get bigger loads . . . faster!

The Oliver-Ware "B" loader was designed and built exclusively for Oliver Model "B" tractors. Its ideal fit with the tractor eliminates unneeded dead weight and assures maximum stability for the entire unit. The Oliver semi-rigid axle allows limited oscillation of the track, eliminating the possibility of track-frame distortion. A hydraulic shock absorber smooths out pressure surges . . . prevents damage to loader and tractor parts.

For complete information on how the Oliver-Ware Model "B" tractor loader can cut costs for you, see or write your Oliver Industrial Distributor.



Plenty of power, plus the wide angle of bucket rotation, assures faster, more positive digging. 28° "roll back" assures maximum break-out action for a full bucket every time.



THE **OLIVER** CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of industrial wheel and crawler tractors







TOURNAROCKER

Dump is fost and safe. With power on from wheels, Tournaracker backs to cope of spil sets rear-wheet backers dumps big loc quickly, and a second for mether land



Tournarocker body is all steel . . . the front % ", the sides %2" plate. Bottom consists of %1" plate with 1%1" billets welded on top at 8" intervals . . . with billets covered by %4" heat-treated tool-steel strips 8" wide (as shown in cut-away section at left).

To reach this job in the Tehachapi Mountains, the 2 rear-dump Tournarockers were driven 125 miles up heavily-traveled U.S. 6 from Los Angeles. Travel speeds reached 35 m.p.h.



Big 8' x 12 $\frac{1}{2}$ ' top opening, plus low rear entry, speed loading of heavy limestone rock. Reinforced all-steel body eliminates a lot of loading shock damage and maintenance troubles.



. . pays off in cramped, mountain-face quarry

Monolith Portland Cement Co. tries one... buys two!

For hauling rock in the cramped quarters of their mountain-face limestone quarry at Monolith, Calif., the Monolith Portland Cement Company recently rented a high-speed, 16-ton C Tournarocker. The rubber-tired rig's speed and maneuverability in moving over winding mountain roads, and the ease with which it moved in and out of restricted loading and dumping areas, increased production so much that Monolith bought it. Soon afterward, they purchased a second C Tournarocker . . . with these 2 units and 2 six-ton dump trucks, replaced a fleet of 10-ton trucks.

Both Tournarockers are now working with 2½ yd. rock shovels at an altitude of 3800'. In typical operation, each "C" carries 16 tons per load . . . completes five 400' cycles every 50 minutes. Hourly output for the 2 rigs aver-

ages 160 tons . . . with the assistance of the two 6-ton dump trucks, ample to keep 2 shovels working at full capacity.

Easy to operate ... easy on operator

There are a lot of reasons why Tournarockers boosted output. With short 90° turns and 13'9" turn radius, the "C's" spotted quickly at both shovel and spillway! Fingertip electric controls kept operators working at peak efficiency all day . . . big, 4-wheel air brakes — with 940 sq. in. braking surface per wheel — gave them maximum safety and confidence for going downhill at high speeds with a full load. As Operator W. S. Wilkson puts it, "Tournarocker is a good machine . . . fast and sturdy . . . easy to operate."

You can prove this performance on your job and increase your rock hauling profits, too. Ask your LeTourneau Distributor for all the details on 9, 18, 35 or 50-ton electric-control, rear-dump Tournarockers.

LETOURNEAU



R. G. LeTOURNEAU, INC.

PEORIA ILLINOIS

HIGH-SPEED, RUBBER-TIRED EXCAVATING . HAULING . LIFTING EQUIPMENT

CHECK the COST-SAVING features of the

B&W CLOSED-CIRCUIT SYSTEM



Limestone, shale and other raw materials are ground and dried automatically and simultaneously within the B&W Closed-Circuit System. No separate drying equipment is needed.

Low fuel costs. With the B&W System, fuel consumption for heating drying-air is much less than with conventional methods. When oil is used, for example, consumption may be as little as 0.3 gal per ton.

A thoroughly mixed product is assured through substantial circu-

The B&W Pulverizer—heart of the B&W Closed-Circuit System is available in sizes suitable to all capacity requirements.

Call in a B&W engineer and find out more about this modern cost-saving system.



CHAINS and SPROCKETS

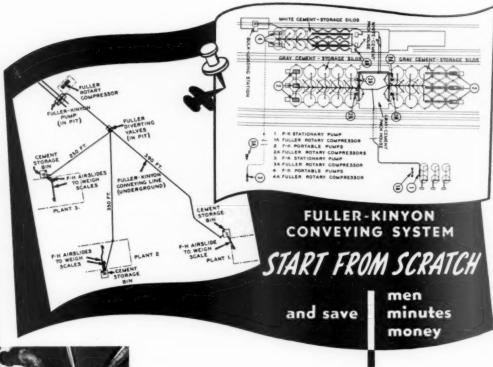
Jeffrey Chains and Sprockets are being put through the acid test of actual service on thousands of tough jobs . . . especially where the demand is for high-quality products. They are in universal use for unit machinery, for conveyors and bucket elevators, and for transmitting power. Follow the lead of those engineers who know the importance of "good chains and sprockets." Send for our new Catalog No. A-418 which goes into detail.

We show only a few types here but Jeffrey builds a complete line from which to choose.



FSTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment





Fuller-Kinyon Stationary Pump conveying from bin.



Fuller-Kinyon Unloader unloading from box car.

The best way to solve any problems of conveying dry pulverized and granular materials is to "Start From Scratch". By that we mean, get all the facts on pneumatic conveying systems while you are still in the planning stage . . . either when building a new plant or modernizing an old one. Pneumatic conveyors permit economy and convenience in location of buildings and production equipment without the restrictions or straight-line limitations of mechanical conveyors. The layout of the conveying system can be designed to meet the specific requirements of the Job, to conform exactly to local conditions, to insure minimum cost for erection, maintenance, and supervision.

Right there is where Fuller comes into the picture. As engineers and builders of four basic types of pneumatic conveying systems, Fuller is able to provide the exact system best suited to individual requirements.

Shown here is the Fuller-Kinyon System for conveying dry pulverized materials. It has many advantages: conveying pipe lines can be located anywhere—underground, suspended on simple hangers overhead, vertically, around corners, over long distances, and to practically any number of delivery points. There are no mechanical or explosion hazards. Conveying is clean, fast, and at minimum cost per ton of material handled.

We invite you to have Fuller Engineers make a complete survey and study of your plant plans—investigate local conditions and the material to be handled. Then they will make recommendations as to the system best adapted to your needs—enable you to save time, money, and material by having both plant and system built at the same time. To consult them places you under no obligation.

FULLER COMPANY, Catazauqua, Pa. 120 So. LaSalle St., Chicago 3 420 Chancery Bldg., San Francisco 4

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS —

COMPRESSORS AND VACUUM PUMPS —

FEEDERS, AND ASSOCIATED EQUIPMENT

P-130

down La Come





costs

with P&H ELECTRIC SHOVELS

These two P&H Electrics serve the same steel-making operation at Birmingham, Alabama. The Model 1600, owned by the Birmingham Slag Company, is loading blast furnace slag. The Model 1400, digging fluxing stone, is owned by the Stockbridge Stone Company.

Wherever these new P&H Electrics take over, costs go down! It couldn't be otherwise, with all the improvements that make for faster, smoother, more dependable digging.

There's Magnetorque* Hoist Drive, which gives you snappier

There's Magnetorque* Hoist Drive, which gives you snappier dipper action with electro-magnetic power — completely eliminates hoist generator, hoist motor, slip friction clutch, and other mechanical devices.

There's P&H stepless power regulation — smoother, more accurate — and no control fingers or contactors to require maintenance or give you trouble.

There's tough, all-welded construction for extra strength without excess weight.

There's more — much more — see a P&H before you invest in new equipment of this type.

Trade-mark of Harnischfeger Corporation for electro-magnetic type clutch.

DA II ELECTRIC SHOVELS

4465 West National Avenue

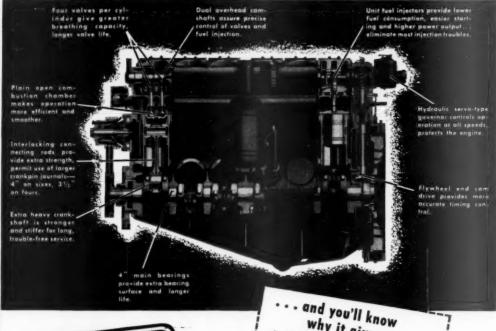
4465 West National Avenue Milwaukee 14, Wisconsin

HARNISCHFEGER

Every third P&74 Electric Showel sold is a repeat order

CompaMURPHY DIESELesign

with that of any other engine

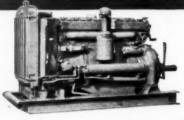




Heavy duty power

for rock crushing

Murphy Diesel Engines and Power Units for portable or stationary crushing plants, 90 to 226 H. P. 1200 and 1400 RPM, Generator Sets, 60 to 140 K.W.



... and you'll know
why it gives you
MORE POWER
GREATER ECONOMY
GREATER DEPENDABILITY
LONGER LIFE

ONLY with Murphy Diesel do you get all the advanced design features described above... and only with Murphy Diesel do you get all extra power, economy, dependability and engine life that this design assures. Proved in thousands of hours of the toughest kind of service, this design has resulted from skilled engineering and long practical experience.

A more detailed discussion of these features and others is given in the booklet, "10 Questions to Ask a Diesel Engine Salesman." You can get a copy from your Murphy Diesel Dealer or we'll be happy to send you one.

MURPHY DIESEL COMPANY

5315 W. Burnham St. Milwaukee 14, Wis. Sales, parts and service in principal conters



you'll WIN a bigger "pile" FASTER

Gardner-Denver equipment helps you eliminate lost minutes — gives you a good chance to speed up quarry production — at a lower cost per ton.





have extra power to keep the bit drilling in a tight hole—extra wind to clean cuttings from the deepest hole. Long steel changes reduce steel handling time. Con-

venient controls increase operator efficiency. Easily adjustable — quickly rolled into position for spotting the hole right where it will give best breakage.

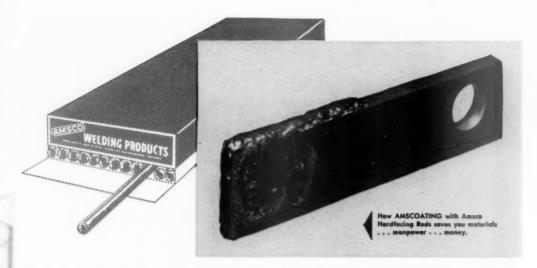


are fully water-cooled—all the way down the cylinder—for allweather dependability. Two-stage compression assures full capacity for top drilling power at any altitude. High efficiency air cleaners—positive lubrication on uneven ground. Write for additional information.

SINCE 1859 GARDNER-DENVE

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS



How to make short work of a long shutdown!

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, beat

Find out how AMSCOATING can save you materials . . . manpower . . . money!

This AMSCOATED Pulverizer Hammer has cut replacements over 90% to date!

Big savings are bound to result when you can reduce shutdowns and replacements. For example, coal pulverizer hammers in a Southern plant were lasting about 5 days before a complicated dismantling job for replacement was necessary. Some hardfacing methods had been tried, but the results still weren't good enough to bring costs down to earth.

Recently test hammers were AMSCOATED with an Amsco Rod specially developed for this type of service . . . and the hammer you see above is now making service life history! Why?

The plant superintendent reports that the AMSCOATED hammers are lasting 14 times longer than plain hammers ... over twice as long as hammers hardfaced by any other method tested . . . that they've been in service 72 days and are still going strong!

This actual example is one of many AMSCOATING applications that are resulting in lower maintenance and replacement costs... higher production. Write today for catalog on dollar-saving AMSCO rods and the name of your nearest AMSCO distributor.





AMERICAN MANGANESE STEEL DIVISION

377 EAST 14th STREET - CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Jaliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

You get more ... you save more with

CHEVROLET ADVANCE-DESIGN

TRUCKS



Whatever the job you have for a truck, Chevrolet has the truck that's right for your job! It's a new Chevrolet Advance-Design truck, built to cut your trucking costs down to

rock bottom. Saves you money when you buy, because the purchase price is low. Saves money right along, because no other truck in its price class offers the great combination of ruggedness, durability and economy you get in Chevrolet. Just look at the extra value features that make Chevrolet trucks stand up better, bandle easier, cost little to run and maintain. Your best truck deal is the deal you get on a Chevrolet Advance-Design truck at your Chevrolet dealer's.

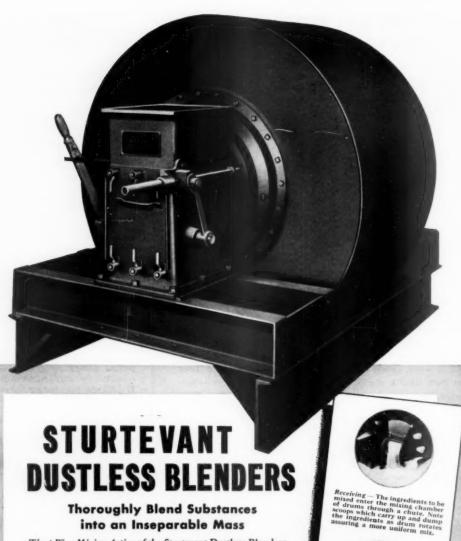
CHEVROLET DIVISION OF GENERAL MOTORS DETROIT 2, MICHIGAN



ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD EN-GINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load . POWER-JET CARBU-RETOR-for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH - for easy-action engagement . SYNCHRO-MESH TRANSMIS-SIONS-for fast, smooth shifting . HYPOID REAR AXLES-for dependability and long life . NEW TORQUE-ACTION BRAKES-for lightduty models . PROVED DEPEND-ABLE DOUBLE-ARTICULATED BRAKES -for medium-duty models * NEW TWIN-ACTION REAR BRAKES-for heavy-duty models . NEW DUAL-SHOE PARKING BRAKE-for greater holding ability on heavy-duty models . NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES —for improved cab ventilation ° WIDE-BASE WHEELS-for increased tire mileage . BALL-TYPE STEERING -fer easier handling • UNIT-DE-SIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.





The 4-Way Mixing Action of the Sturtevant Dustless Blenders thoroughly mixes two or more substances into an inseparable whole . . . every part of which is the same analysis. Single receiving and discharging opening insures tight sealing during mixing process. "Open-door" accessibility permits thorough cleaning. The fast, accurate mixing operation increases output . . . cuts mixing costs. Available in mark rices with mixing capacities from 1/2 costs. Available in many sizes with mixing capacities from 1/4 ton to 75 tons per hour. Write for information and catalog.



Discharging Throwing a lever closes the inlet and mixer is in discharing position. The con-pletely maked materials drop off the lifting plant of the con-trolled the con-trolled through church without segre-gation of ingredients.

The Sturtevant Mill Company

102-A Clayton Street, Boston 22, Massachusetts Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

From Start to Finish... YOU'RE TIME AND MONEY AHEAD with Tirestone TIRES

When you start a job, you want to get it done in the shortest possible time at the lowest possible cost. The kind of tires you use has a lot to do with both.

When you buy Firestones, you pay no more than you do for other tires. But you GET more — more rubber in the treads . . . You get double-thick, cut resistant sidewalls. You get four extra plies that protect the Gum-Dipped cord bodies, which can be retreaded again and again. And you get more service from your Firestone Dealer or Store.

Add up these advantages. They mean more hours of service . . . less delays and downtime. You're time and money ahead with Firestone Tires on your equipment.

Enjoy the Voice of Firestone on radio or television every Monday evening over NBC

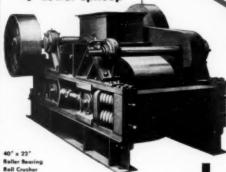
Copyright, 1951, The Firestone Tire & Rubber Co.

ALWAYS SPECIFY FIRESTONE TIRES
WHEN BUYING NEW EQUIPMENT





- Greater capacity per weight
- Less horsepower needed
- Less wear
- Lower upkeep



APPLICATION DESIGNED FOR ANY CRUSHING JOB

Diamond Portable Crushing and Screening Plants use Diamond Roll Crushers without flywheels or subframe. Plant's frame acts as Crusher's subframe. Flywheels of Jaw Crusher supply power to Roll Crusher through roller chain drive. Also available as a self-contained unit mounted on electric welded steel frame.

CHECK THESE EXTRA FEATURES!

- Manganese steel roll shells, plain or corrugated
- Floating roll with safety spring release
- Safety shear pin sprocket
- Easily removed roll shells
- Rapid roll adjustment

Fartable Plants

led On "95" and '94-B" Reter-Lift Plants Two Countershafts End" Backslap" **Hold Closer Aggregate Gradations**

CRUSHERS

MORE efficient secondary crushing of specified material is possible with Diamond Roll Crushers. Continuous crushing action of Diamond Roll Crushers plus their dual countershaft design permit rolls to be set and held to closer crushing tolerances. More accurate roll adjustments give maximum output with minimum oversize ... assure meeting production schedules.

A STEP AHEAD IN ROLL CRUSHER DESIGN:

CHAIN DRIVE permits greater flexibility in roll settings-from "closed" to 4" depending on size of crusher.

STATIONARY SHAFTS (on crushers 30 x 18 or larger) not subject to friction, wear, or possible bending.

ROLLER BEARINGS mounted within roll shells permit rolls to revolve around stationary shafts. Direct drive eliminates stress on roll shaft and drive chain.

COUNTERSHAFTS eliminate excess sagging and snapping of chain.

FLYWHEELS allow crusher to be driven directly from power unit or from auxiliary countershaft.

16 x 16 - 24 x 16 - 30 x 18 - 36 x 20 - 40 x 22 CAPACITIES TO 200 TONS PER HOUR

GET a Diamond Roller Bearing Roll Crusher for fast, uniform finish crushing in reduction ratios up to 4 to 1.

Ask for Equipment Bulletin D-51-C. Write c/o Dept. F.



AND THE MAHR MANUFACTURING CO. DIV.

1766 N. 2ND STREET, MINNEAPOLIS 11, MINNESOTA

Your Union Multiwall Specialist

Knows many ways to cut packaging costs

How LONG has it been since an expert analyzed your packaging methods?

Recent improvements in packaging methods and materials now make Union Multiwall Bags the preferred packaging for many different commodities . . . over 300 in all. They speed up packaging, cut labor and shipping costs, guard against contamination.

Even if you're now using multiwall bags, the Union Multiwall representative who calls on you can give you new ideas that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulpto-bag plant in the world, and skilled engineers and designers.

Let him show you how Union resources and packaging experience can help you!





UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

Offices in: CHICAGO, ILL. • NEW ORLEANS, LA. • MINNEAPOLIS, MINN. • KANEAS CITY, MO. • HOUSTON, TEXAS



BUILT TO STAY ON THE JOB AS LONG AS THE JOB LASTS!





"DUPLEX DRILL RIG" SPEEDS PIPE LINE DRILLING

For complete details write for free Bulletin No. MC-3620

EASILY CONTROLLED—All operations of the drifter—drilling, feeding, blowing—are controlled by two closely located handles mounted at the feed motor near the bottom of the mast.

QUICKLY ADJUSTED — By loosening two bolts on each clamp, masts can be easily swivelled from 24" minimum to 60" maximum span.

FASTER DRILLING—Positive feed control of 5 h. p. rotary air motors, PLUS tremendous hitting power of Thor 4" Drifters enable the rig to "pay for itself" compared to slow, costly drilling with hand-held drills!

Independent Pneumatic Tool Co.
Aurora, Illinois



Back of Your New

BIG SERVICE GM Diesel Power

Your G.M. Diesel Distributor

We want every purchaser or prospective purchaser of one of our engines to know how his local GM Distributor and Dealer, with their factory-trained servicemen, stand back of the product. They in turn are backed by the knowledge that Detroit Diesel supports them strongly in their adherence to this policy.

Installation Inspection:

The GM Diesel serviceman inspects and checks the engine without cost to the owner; whenever possible this is done before the engine is put to work. He explains how to successfully operate the engine and the "preventive maintenance" necessary for best results in days to come.

2. Performance Inspection:

From thirty to sixty days after the engine has begun its job, another inspection is provided without charge. The GM Diesel serviceman makes any adjustments that may be required and tunes up the engine to its best performance.

3. Owner's Service Policy:

Besides the above inspections, GM Diesel owners are protected by the exceptional warranty mentioned in the owner's service policy.



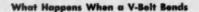
SINGLE ENGINES... Up to 275 H.P. DETROIT 28, MICHIGAN MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT



Here is **Exactly WHY** a V-Belt with **CONCAVE SIDES Gives You Longer Wear!**













To see for yourself how a V-Belt that has concave sides is certain to give longer wear, just make this simple test:-

Pick up any V-Belt you have at hand. Bend that belt as it bends around a pulley. As it bends, grip its sides between your fingers. Here is what will happen everytime.

If the V-Belt you are testing has straight sides, you can feel those sides bulge out as the belt bends. This out-bulge forces the sides of the belt to press unevenly against the V-Pulley and you naturally get concentrated wear just where the bulge is greatest—as shown in figure 1-A, at left.

Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an out-bulge when you bent a belt with straight sides, you find that the Concave Sides merely fill out and become perfectly straight. The sides therefore press evenly against the V-Pulley. This distributes the wear uniformly across the full width of the belt. Naturally, this means longer belt life and lower belt costs for youl

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Ropel



Gates Vulco Rope Drive on the Mine fon of Slass Sheffield Steel & Iron Company, Birmingham, Alubama. The drive operated 24 hours a day for 3 years without



ided Rubber Goods

IN ALL INDUSTRIAL

THE GATES RUBBER COMPANY

DENVER U.S.A.

The World's Largest Makers of V-Belts

This 'dust' man can be your best friend

Let him show you how you can Reclaim the Values in Escaping Dust-Wet or Dry

If valuable dust is escaping from your plant, you're overlooking an opportunity to attain top overall efficiency.

How to recover this dust loss...how to exploit its full value, is Buell's job. That's why so many plant operators include us among their best business friends.

Looked up to as a leader in the science of dust collection, Buell draws on more than 200 man-years of experience in the design and construction of highefficiency, economical-to-operate collector equipment.

Therefore, if a valuable-escape-dust problem exists in your plant, probably we can help. For full information about Buell techniques and methods write today. Ask for the new 'Dust Recovery' bulletin. Buell Engineering Company, Dept. 17-J
70 Pine Street, New York 5, N. Y.

Buell Cyclones assure unusually high efficiency in cement dust recovery, because of the exclusive 'Shaveoff' feature.







MIGH-EFFICIENCY CYCLONES

**ELECTRIC PRECIPITATORS

LA COLLECTORS

LOW DRAFT LOSS COLLECTORS

**SPECIAL PURPOSE COLLECTORS

DUST MOPPER VALVES

ENGINEERED EFFICIENCY IN DUST RECOVERY

IS YOUR SHOVEL OPERATOR "POOPED" AT QUITTING TIME?

EASY-TO-RUN BAY CITY HELPS OPERATORS DO A BIGGER, BETTER DAY'S WORK

BAY CITY Shovels really cut operator fatigue with mechanical improvements that simplify operation and give smooth performance. The well-raised seat is comfortable. The cab design permits an unobstructed view for the operator. All controls are conveniently arranged within easy reach. Booster clutches permit fingertip control of front drum and hoist clutches with swift, positive action.

The electric power dipper trip dumps quickly and easily. Anti-friction bearings and helical-cut gears insure quiet operation.

With a BAY CITY Shovel on the job,
your operator will do a bigger and better
day's work, too. For complete information
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dealer or write us today.
BAY CITY SHOVELS, INC.,
BAY CITY, MICHIGAN



Diesel powered 1 yard Model 59 working for D. J. Carten Sund & Gravel Co. of Stratford, Conn.

CHECK LIST

Fully Convertible
Long, Wide Crowlers
Alloy Cast Boses
Tandem Drums
Power Dipper Trip
High Line Speeds
Wide Vision Cabs

POWER BOOSTER CLUTCHES — The wide, heavyduty hoist and front drum clutches are set with engine power by a mechanical type booster clutch that gives easy operation, simple adjustment and accurate load control. A short, easy throw of the operating hand lever sets the main clutches to permit fingertip control with fast, positive action.





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Steel

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MORE steel-100 tons more steel every 5 hours. That is what the new electric furnace, pictured at the right, added in August to your at-home steel-making capacity.

Still another of these new, fast steel-making furnaces will be operating at year's end to double this capacity increase. Another blooming mill and auxiliary equipment will also be completed at Sheffield mills.

Yes Sheffield is doing more than its share to enable America to continue to use twice as much steel as all the rest of the world and keep on forging the highest level of better living the world has ever known.

In the past 10 years Sheffield has more than doubled your at-home steel-making capacity. In the same period of time, the steel industry as a whole has increased about one-fourth.

West of the Mississippi and East of the Rockies—Sheffield's primary trade territory—steel-making capacity is looming larger and larger, to meet your needs and make a larger contribution to the industrial growth of the region.





SHEFFIELD MOLY-COP

COPPER - MOLYBDENUM

Grinding Balls

USED and PROVED
ALL AROUND
THE WORLD



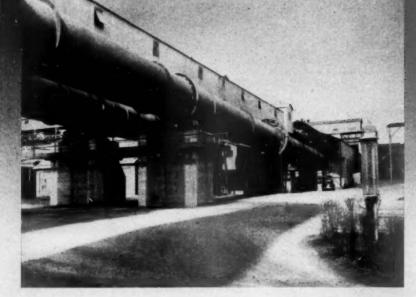
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MORE STEEL FOR AMERICA More Money In Your Pocket! GET YOURS OFF TO



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ROTARY KILNS



141 Smidth Rotary Kilns have been sold from January 1946 to December 1950.

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October, 1951

Construction in the 37 states east of the Rockies for the first seven months of 1951 set a new high for that period with a total of \$10,187,939,000, or 23 percent higher than for the corresponding months of 1950, according to an F. W. Dodge Corp. report. However, total construction awards slackened a bit in July, compared with June. The July total of \$1,379,830,000 was down 2 percent from the previous month and down 3 percent from July, 1950. Public and private works and utilities were 5 percent below, but 14 percent above July, 1950.

With a serious coal shortage already a certainty in Great Britain again this winter, the British government is urging all municipalities to retrieve the cinders they throw into ash cans, according to a report in The Wall Street Journal. The Ministry of Fuel recently completed a survey indicating that for every 100,000 people about 1500 tons of burnable coal is thrown away each year. The government plans to recover and sell discarded cinders as fuel for various types of industrial boilers. Other plans include the building of plants to separate the cinders from the dead ash and then turn them into briquets—small block of compressed coal dust which would have a much wider range of use.

* * * * * * * * * * *

The nation's 250 steel foundries are heavily engaged in producing castings for defense programs. Volume of steel castings for 1951 is predicted to greatly exceed the 1,405,000 tons produced in 1950. A large part of the production now is going into steel mill expansions and government programs, particularly for freight cars and locomotives.

The Economic Cooperation Administration has estimated that between \$50,000,-000 and \$100,000,000 will be spent for the development of strategic material-producing projects overseas, during the 12 months beginning last July 1. If products such as coal are included in the estimate this figure would run from \$200,000,000 to \$250,000,000.

One of the world's largest rubber plants—the government-owned plant at Institute, W. Va., has recently been reopened. It was stated that all production lines, which had been in standby condition since 1947, are operating slight—ly above their rated capacity of 90,000 long tons annually. The plant is being operated by B. F. Goodrich Chemical Co. which also operates a 60,000-ton unit at Port Neches, Texas, which is producing in excess of its rated capacity.

* * * * * * * *

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A complete mastodon skeleton, prehistoric relative of the elephant, was recently discovered by Ray and Clint Kallestad, owners and operators of Kallestad Sand & Gravel Co., of Montana, as announced by Montana State University scientists. The animal was estimated to have lived between 25,000 and 50,000 years ago and possibly stood about 16 ft. high. One tusk measured 5 ft. long.

Chemicals which show promise as agents for controlling soil erosion are undergoing tests at Ohio State University, as reported by Engineering News-Record. The research project was begun in December, 1950, at the university's engineering experiment station to determine effectiveness of the chemicals in "anchoring" soil samples from various parts of the country and subjecting them to erosive action of artificial rain.

American principal rural highways, the federal aid system, will require nearly \$30,000,000,000 to bring them up to modern standards, according to a recent report by the American Road Builders' Association. It was stated that the much needed modernization process will include the replacement of 430,000 miles of road, or 68 percent of the 630,000 miles of roads which carry more than 80 percent of all rural traffic. It will also mean the rebuilding of 72,000 bridges.

A House Appropriations subcommittee has charged that army engineers have cost taxpayers millions of dollars by misleading Congress with their estimates of flood control and rivers and harbors projects. It was stated that a total cost of 182 projects being built is now estimated by the engineers at \$5,912,-451,000, compared with their original estimate of \$2,638,517,000. Some of the difference was attributed to higher prices, but the group asserted that \$800,-000,000 of it was due to "insufficient engineering and planning and estimating."

Production of most classes of clay products rose slightly during May, 1951, according to an Engineering News-Record report. Unglazed brick production for May was 605,000,000 units; clay sewer pipe production was 145,000 tons; unglazed structural tile amounted to 106,000 tons.

The National Production Authority has tightened up its controls on the distribution of fabricated concrete reinforcing bars, according to a report in The Wall Street Journal. A fabricator must now obtain an allotment for the bars from his customer. Previously, a customer did not have to use a C.M.P. allotment for obtaining the bars.

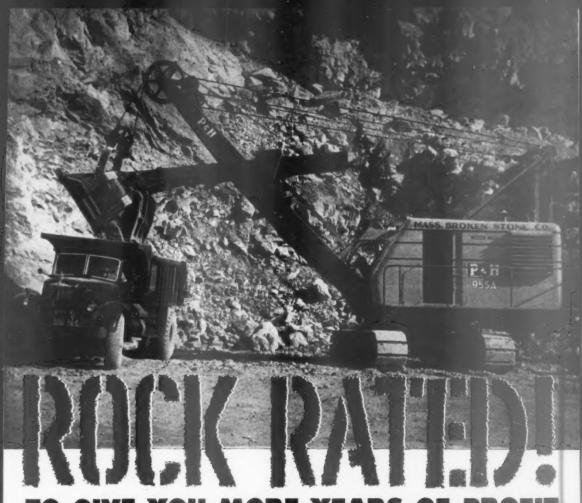
According to a recent report in The Wall Street Journal, the R.F.C. is drawing up a plan for turning over its synthetic rubber program to private industry. However, the transfer would not be made until the "present emergency" ends. The government agency owns 28 synthetic rubber-making plants throughout the United States which account for most of the synthetic rubber produced. All are operated for the government by private rubber companies which get a fee for their services.

It has been reported that Dow Chemical Co. may build new plant facilities at the rate of \$100,000,000 a year for the next several years. A company official stated that the company has been unable to keep up with demand despite average expenditures of \$59,000,000 a year for facilities over the last five years. Much of the expansion seems to depend upon the ability to obtain certificates of necessity from the government, permitting rapid tax writeoffs on plant investments. Thus far, the company has applied for certificates on \$288,000,000 worth of construction and has been awarded certificates averaging 61 percent on \$135,000,000, with the rest pending.

A total of \$9,361,000,000 for engineering construction of all classes for the first 33 weeks of 1951 was 25 percent higher than corresponding contract awards for the same period of 1950, as reported by Engineering News-Record. Private construction totaled \$4,941,200,000, a gain of 15 percent. Public works totaled \$4,419,800,000, which was an increase of 40 percent. Federal contracts were up 99 percent, while state and municipal awards had a gain of 18 percent.

It was recently reported in Chemical and Engineering News of the develop-ment of a long-lasting road material which may be applied in any kind of weather, can be stockpiled in readily usable form throughout the winter and laid down without heating. It is a mixture of special bituminous binders and aggregates which, it is claimed, can be mixed cold, does not adhere to spreading equipment, can carry traffic immediately after rolling, resists skidding and does not bleed in hot weather.

THE EDITORS



TO GIVE YOU MORE YEARS OF PRO



PEH MAGNETORQUE ELECTRIC SWING SAVES YOU TIME, TROUBLE, MONEY!

> Bring on your heaviest going! The 955-A is ready for it! It's the 21/2 yd. companion of the famous P&H 1055 - with all its proved engineering - tough all-welded construction - greater stability - live roller circle - adjustable hook rollers - and many other advancements that assure years of hard service with minimum cost.

> Operating advantages? More than you've ever known in a machine of its size. Magnetorque Swing does away with the old swing frictions - with all their T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

headaches - forever. It's faster - 15% to 25% faster.

Ask us where you can see one in operation. Learn what "ROCK RATED" really means.



Barber-



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series

BELT CONVEYORS



MOW

More than ever, machines must be used most effectively. Redi-Fab Conveyors offer the fast, sure way to release shovels, cranes, tractors and the like for more productive work—to minimize manpower requirements and increase productivity. Send for your copy of Redi-Fab Catalog RF.

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"PACKAGED" UNIT CONSTRUCTION

HERE ARE TYPICAL REDI-FAB PACKAGES ...







Foot End-available factory-assembled, and ar in "packaged" components

Hood End

Intermediate Section—penal package
frame package and carrier

Redi-Fab "packages" are logical, convenient groups of parts er inctory-assembled components packed or bundled for individual shipment. This saves shipping costs, simplifies stocking, ordering, erection and future alterations.

All packages are clearly marked for easy assembly. All the engineering has been done at the factory. Your Redi-Fab Conveyor can be assembled quickly by a few semi-skilled men.

WIDE CHOICE OF COMPONENT EQUIPMENT & ACCESSORIES





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The new 40-page catalog makes it simple for you to figure your own conveyor requirements if you wish. No knowledge of horse-power required. The catalog makes possible the proper selection of the conveyor with the correct size of drive and motor. In fact, with the new layout sheet in the Redi-Fab Catalog, you can make your own layout—accurately, down through all details including locating the A-trame supports. Write for your copy, or ask your B-G distributor.



BARBER-GREENE COMPANY

AURORA, ILLINOIS, U.S.A.

LIPPHARM SELF PROPERTIES STALL GRUSHING PLANT

Works 12 pits in 5 months
DRIVES 219 MI.
HITS 1100
YARDS PER DAY

Circuit Rider

22 mi. May 15 5,500 7 mi. June 1 4,500 2 Town of Lake 18 mi. June 16 8,229 2 mi. June 30 4,200 PORTERFIELD May 15-26 5500 cu. yds. 12 mi. July 18 1,546 July 20 12 mi. July 21 1,000 July 25 60 mi, July 27 4,500 Aug. 3 26 mi. Aug. 5 10,000 Aug. 24 6 mi. Aug. 28 4,200 Sept. 1 14 mi. Sept. 2 12,000 10 Lens 18 mi, Sept. 27 4,000 Oct. 2 22 mi. Oct. 4 4,000 Oct. 14 63.725* On every job, plant was not operating part of the time be cause tracks had to be used too fill jobs. In addition, during this period, plant produced another 10,000 yards of materia for the home yard which is not shown.

SELF-PROPELLED CRUSHING PLANT

Belongia Construction Co. Easily Covers 60-Mile Radius Around Oconto, Wis. with Lippmann Self-Propelled Dual Crushing Plant. Read How You, Too, Can Move Ahead to Greater Profits!

Just think of it! You're working in a pit... the job is almost done... and you've a chance for another job 50 miles away, but it's a tight schedule.

How would you like to climb into a self-propelled crushing plant ... pull out of the pit ... drive onto the highway ... and wheel along to the next job at 18 mph?

Then picture yourself driving into the new pit in your Lippmann Circuit Rider...and four minutes after you leave the highway, you're loading a truck with stone.

Nice profitable picture, isn't it?

And that's just what Belongia Construction Co., Oconto, Wis., does with their Self-Propelled Lippmann Circuit Rider, the complete, all-in-one dual crushing and screening plant.

HITS 1100 YARDS PER DAY!

Turning out ¾ in. stone, they consistently were able to hit 1100 yards in an 8-10 hour day. Because in the pit, Circuit Rider easily follows the shovel—there are no separate bins, conveyors or engines to set up and adjust...no jacking, leveling or excavating necessary on the plant itself.

Check the "log" of this typical Lippmann Circuit Rider owner above. See for yourself why leading operators find it pays to own the only selfpropelled dual crushing and screening plant on the market today.

You can put yourself in this picture— Belongia shovel-feeds self-contained Circuit Rider from one end, discharges into trucks at the other.





FOR ALL THE FACTS on the complete Lippmann line for pits mines and quarries write for: Griztly King Jaw Crusher (Bullatin 1100), Screen-All Vibraring Screens (1200), Pul veriexe: [1160], Bell Conveyors (1400), Gyra-Gome Secondary Crushers, Circuit Riider Self-Propelled Crushin

LIPPMANN ENGINEERING

4603 West Mitchell St., Milwaukee 14, Wisconsin

this record proves

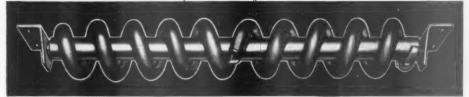
THE RETURNS FROM

RETURN IDLERS

COST RECORD (In a large western cole plu

TYPE OF IDLER	Steel	Rubber Covered Spire		
SERVICE LIFE	3 months	12 months		
COST 1st YEAR	\$66.80 for 4	\$47.70 each		
SAVING 1st YEAR		\$19.10		
Cost of Replacement				
Subsequent Years	\$66.80 for 4	\$18.20 each (rubber covering)		

SAVING per year after 1st YEAR \$48.60



 $\mathbf{Y}_{ ext{es}}$, the cost record from just this one plant clearly demonstrates the savings possible through the installation of Rex Rubber Covered Spiral Return

Before the installation of these cost-cutting idlers, the abrasive action of coke breeze clinging to the return side of the belts wore out the standard steel return idlers in an average 3-month period.

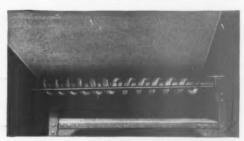
15 Rex Spiral Return Idlers were installed for trial and have given at least 12 months' service-4 times longer than the steel idlers. These idlers provide a constant, ever-changing point of contact between idler and belt, preventing build-up of material on the idler and, in some cases, helping to clean the belt.

Cost records show that the 15 Rex Spiral Return Idlers made possible a saving of \$19.10 per idler and \$286.50 total saving, including initial and installation costs. After the first year, the spiral rubber covering can be replaced, if worn, at a cost of \$18.20 per idler. This cost as compared to \$66.80, the cost of 4 new steel return idler rolls, indicates a saving after the initial year of \$48.60 per year.

Add to these savings, the elimination of down-time

caused by the frequent replacement of steel idler rolls. which makes the cost-cutting advantages of Rex Rubber Covered Spiral Return Idlers even more obvious.

Why not investigate the advantages of Rex Spiral Return Idlers and the other idlers in the Rex Line for your operations? Mail the coupon for your copy of Bulletin No. 463R.



Rex Rubber Covered Spiral Return Idlers installed in this western coke plant delivered 4 times longer service than conventional steel return idlers previously used.

Chain Belt Company

BELT CONVEYOR IDLERS

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Ple	ase send i	neac	ору	of	Bul	leti	n I	1-1	0.				
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DEPENDABLE All the basic raw materials that go into the making of every type of Kraft Bag come out of Kraft Bag Corporation's own quality-controlled integrated paper mills. That's true specialization - true dependability, from the Ground Up! Send your product to market in a Kraft Made! made-to-order Kraft Bag . . CORPORATION GILMAN PAPER COMPANY SUBSIDIARY 630 Fifth Avenue, New York 20. N.Y. Daily News Bldg., Chicago 6, III. DEPENDABLE AS A SOURCE. DEPENDABLE AS A SERVICE If your product fits into a bag — we'll make the bag to fit your product.

Increasing Production Through "Productive Maintenance"

THE TERM "PRODUCTIVE MAINTENANCE" that General Electric Co. has adopted for a program to help industry get maximum production from its existing equipment is well chosen. It suggests the true recognition that maintenance should be given by top management and has been presented at a time when all classes of manufacturers and pro-

ducers should analyze its full meaning.

Purpose of the program is to conduct maintenance according to a scheduled plan whereby capacity output of a plant will be raised through minimizing unscheduled shutdowns that ordinarily are accepted. Capital equipment is getting tighter in supply, and labor to operate enlarged plants is becoming scarcer, as we all know, so much of the answer to increasing demands for products lies in gaining increased output from existing operations. Plant "capacities" need re-appraisal, for they can be stepped up through more continuity of operations.

Even in the supposedly best managed plants. maintenance usually is looked upon as something to be done when the occasion arises or after some emergency has developed. The term "preventive maintenance," which applies to some programs adopted, sounds good but usually is a defensive maneuver practiced to minimize losses in production. Insufficient thought is being given to the plus values of a coordinated and scheduled plan of operations which would place maintenance in the category of production for obtaining increased output over and above existing plant capacities.

Briefly, the General Electric plan recommends adequate, trained personnel who have at their disposal the necessary tools to perform properly the functions of regular, routine checks of operating equipment, and planned removal of equipment from service at regular, scheduled intervals. Then, the rebuilding and modernization of equipment during the time of planned outage is done with an adequate stock of mechanical and electrical re-

newal parts.

There is no reason why any producer cannot actually inspect, with the aid of instruments, the condition of drives, emergency cut-off and control devices and other equipment. He certainly should develop a file system covering the history of every machinery unit, as suggested, to guide him in a planned productive maintenance program. This would include not only historical data on each machine but outage forms and checklists for motors, controls and other equipment. To aid maintenance men, the services of engineers have been offered in setting up a program and to guide in establishing a working spare parts control.

While we are not familiar with the detailed recommendations covering spare parts, an adequate stock of maintenance parts is extremely important to any sound maintenance program. Those parts should be purchased from the equipment manufacturer and not from cut-rate shops or any sources unfamiliar with the equipment, which practices have many times over been demonstrated to be costly in the long run.

With respect to the planned "outage" provisions of the program, that important phase may not seem realistic to some producers of rock products who have straight-line production plants which depend on each unit of equipment for continuity. Usually, however, there is some flexibility even in such operations and it is characteristic of the industry that it is constantly undergoing changes. production-wise, which revamping could be planned to accommodate a planned schedule of outages.

Savings in unit costs obtainable from increased production over the long run, resulting from scheduled removal of equipment out of service as contrasted to unscheduled stoppages, are of sufficient magnitude as to influence future plant design. From the standpoint of productive maintenance alone, aggregates plants would prove far more economical if surge piles or bins for unprocessed or partially processed material be provided to permit scheduled partial shutdowns for repair and maintenance.

Duplicity of equipment, such as vibrating screens or crushers operated in parallel, provide favorable conditions, as do units of equipment which have over-capacity. Newer plants, like cement mills which have long-accumulated records that show the true value of maintenance in production, are finding it economical to purchase expensive machinery like grinding mills with overcapacities so they can be pulled out of service without interrupting rated plant output.

Programs like the one of General Electric and those offered by other key manufacturers serving these industries deserve careful consideration. Any constructive ideas to reduce unit costs should be practiced always, regardless of the economic conditions. It's just good business. As for the present and immediate future, the only answer to profits at all is large volume and the pressure from management is getting greater for more of it.

Bron Nordberg

1940

Austin-Western CRUSHING PLANTS

for Arthur & Allen of Pueblo, Colorado

1949

Crushing slag from the Colorado Fuel & Iron Company's Pueblo plant to produce ballast for the Santa Fe, Missouri Pecific and Rock Island Railronds.



The man at the feed conveyor in the foreground is sulvaging iron from the slag.



These conveyors are carrying the combined output of jaw and roll crushers.

This, the fourth Austin-Western Crushing and Screening Plant purchased by Arthur & Allen over a ten-year period, has an average run of 350 tons per hour and has reached a peak output of 420 tons per hour. The finished product is, in almost all cases, 11/2'' minus to 38'' plus. The percentage of crush is approximately 60.

Whatever your production requirements, an Austin-Western Plant, designed and tailor-made to meet them, will do the same sort of outstanding job for you. Let's talk it over.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

Subsidiary of Baldwin-Lima-Hamilton Corporation

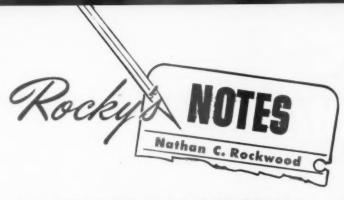


The leading happer is arranged to accommedate two trucks at one time.

Austin



estern



Recent Developments in Soil Chemistry

M OST PRODUCERS OF agricultural lime, limestone, rock phosphate, gypsum and other possible mineral fertilizers have some understanding of soil chemistry. Otherwise their sales promotional efforts must be more or less blind. Twenty-five or more years ago, agricultural liming materials were applied to "sour soils" to "sweeten" them. The only scientific test applied was to determine whether a soil sample gave a basic (blue) reaction to litmus paper or solution or an acid (pink) reaction. Gradually we came to understand that the calcium in lime, limestone, gypsum and rock phosphate was a "plant food," that it was absorbed into the plant structure. Now, through progress in plant and soil chemistry, we know that lime, or calcium in other forms, has various functions; and our knowledge is constantly expanding.

This fact is brought strongly to mind by some recent publications. One of the most interesting of these is "Science and the Land," the 1949-50 Annual Report of New Jersey Agricultural Experiment Station. This experiment station has always been a leader in literature on soil liming. Recent reports have been gotten out in the form of questions to practical problems, with answers by various specialists on the staff. This method is probably of greatest value to the practicing agriculturist, but it scatters data on such subjects as the use of lime so that a thorough study of the entire report is necessary to assemble it all. We will not attempt to do that but merely to touch on some of the spots which may not be familiar to many producers.

Manganese and Lime

Recent work on the effect of trace elements on plant and animal life has shown the importance of manganese, especially to the reproductive functions. Along with work on manganese it has been established that a soil can be overlimed for best results. The report puts it in these words: "Manganese deficiency is now known to be largely confined to soils that have been overlimed. Under such conditions, the standard application is 50 lb. manganese sulfate an acre an

nwally as long as the soil pH value remains above 6.5 (7.0 is neutral). We recommend that soils be limed only to pH values that are between 6.0 and 6.5 (slightly acid). For most crops a pH value of 6.0, if maintained throughout the crop season, is entirely satisfactory."

Knowledge of such points as this should help the lime or limestone producer to more effective sales promotion, because it supplies an answer to problems that arise from the bygone theory that if a little lime is good, more is better. If his customer does not get expected or promised results from the use of liming materials, the producer should be able to reason with soil experts to find out why, and to suggest remedies that will not hurt, but stimulate the demand for his liming materials. In the older farm regions where lime has been used longest, such difficulties naturally arise.

Incidentally, the report we are quoting from gives a new use for gypsum as a soil corrective. It has long been known that the use of gypsum was one way of restoring an alkali soil to cultivation. Anyone who is interested in the chemistry of this process is referred to a new book "Alkali Soils" by Dr. W. P. Kelley, University of California, Berkeley, Calif. Eventually alkali soils will become a problem in nearly all Far West irrigation areas, and will in the course of time furnish a large market for gypsum, or byproduct calcium sulfate made in some industrial processes.

Drainage of soil is important to alkali removal, which makes interesting a recent discovery in New Jersey that gypsum is useful in draining wet spots. The report says: "Such good results were obtained with gypsum in draining wet spots that several thousand tons of the material have been used for this purpose. Examination of areas on which it was used successfully showed a free-draining subsoil beneath. This allowed the water to be carried away, once it got past the tight zone that usually was found within or just below the plowed zone. Careful studies of three such cases where gypsum had been applied at a

^oReinhold Publishing Corp., 230 West 42nd St., New York, N. Y., 1951, \$5.00. rate of 2 tons an acre showed that the speed of water movement through the soil was increased by an average of 36 percent. The treated soils were drier than the untreated and had more air-pore spaces."

To one interested in highway construction, where it is known that poor drainage under the pavement is responsible for much pavement deterioration, the question at once arises as to whether or not the application of gypsum to such subgrades would be advantageous. Experiments with lime in the treatment of subgrades leads one to suspect that it is the calcium colloid reaction rather than the sulfate which does the trick. One is also driven to the question whether or not pulverized limestone would not serve the same purpose as a pavement subgrade corrective.

Applications of Colloid Chemistry

All these things emphasize how very important it is to producers to keep pace with developments in colloid chemistry. We are getting close to the point where many of the mysteries and anomalous results in the use of portland cement concrete, as well as soil amendments, will be explained on the basis of ion exchange, or colloid chemistry. Experiments with elements artifically made radioactive, such as sodium, calcium, cobalt, zinc, chlorine, etc., are already under way in agriculture. The same kind of experiments must soon be done in cement and concrete. For example, it is stated in the New Jersey report that radioactive calcium will not move or diffuse from calcium treated plant roots to nearby untreated roots. This fact is given as proof that for best results a very thorough mixing of the applied lime throughout the rooting zone of plants is essential. Hence proper distribution on the field is as important as application of lime itself.

Another matter of direct interest to rock products producers is to follow developments in the application of trace minerals to soils. The question will be whether to add such trace elements as concentrates, as shown in the New Jersey report by the use of 50 lb. of manganese sulfate per acre, or to use a pulverized limestone or other raw rock which contains the equivalent of 50 lb. of manganese sulfate. Prof. W. D. Keller of the University of Missouri is a strong believer in the use of raw rocks which contain these trace elements. In a chapter on "Industrial Minerals and Rocks as Plant Nutrient Sources," in the 1949-50 Report of the State Geologist of Maine (Prof. Keller is a consultant geologist for the Maine Geological Survey), he writes: "The opportunities and possibilities for furnishing inorganic plant foods widen tremendously after one realizes that any rock is a potential fertilizer, provided it can furnish efficiently to a chemically active clay or humus soil colleid, an element which is needed by plants,"

"EUC" PERFORMANCE Pays Off IN MINES and QUARRIES

"Eucs" are designed and built for moving coal, rock, ore, overburden and heavy excavation at the lowest cost. The simple but rugged construction of Euclids, combined with large capacity, ample power and speed, provide efficient off-the-highway hauling of practically any material.

Euclids are standard equipment in many leading open pit mines and quarries, and on construction and industrial work. Owners know that Euclid staying power and continuous operation result in more loads hauled in less time at lower cost.

Ask your Euclid distributor for data on auarry or open pit jobs similar to yours. There is a Euclid to meet your requirements for off-the-highway hauling work.

Rear-Dump Euclids-Capacity from 10 to 34 tons-diesel engines from 125 to 400 h.p., spring mounted or semi-

rigid drive axles-top speed loaded up to 35.7 m.p.h.

MORE LOADS PER HOUR-MORE PROFIT PER LOAD

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

LABOR RELATIONS TRENDS

Wage and Hour Laws' Coverage of Concrete Products and Ready-Mix

By NATHAN C. ROCKWOOD

T WO RECENT DECISIONS of Federal Authorities throw light on interpretation of the Fair Labor Standards Act and the Walsh-Healey Publie Contracts Act in their application to what one would ordinarily consider strictly local business. The first one cited below is of special interest because of the Court's inclusion of clerical employes, as well as yard employes who actually handled incoming shipments of materials from without

Concrete Block Manufacture

The U. S. District Court of the Southern District of Florida rendered its decision in the case of Secretary of Labor Tobin vs. Joseph M. Ripley, Inc., Jacksonville, Fla., concrete products manufacturer, on July 13, 1951, Civil Case No. 1928. The issue was whether employes of the manufacturer who were engaged in receiving materials from other states, spotting and unloading freight cars, putting these materials in storage, etc., were engaged in interstate commerce, and hence their employer subject to the Fair Labor Standards Act.

The Secretary of Labor brought the suit to enjoin alleged violations of the law both as to rates of minimum pay to certain employes, and failure to pay time-and-a-half for overtime after a 40-hr, week. He further charged failure to keep adequate and accurate records. The sale of the block was confined to the State of Florida, and the manufacturer claimed that he was not engaged in interstate commerce. Here are the words in which the Court decided the employes were under the Act:

"(3) Since April 1, 1950, large quantities of the ingredients and materials used by defendants in the manufacture of concrete block have been and are being purchased from dealers, suppliers and manufacturers located outside the State of Florida, and are regularly shipped and delivered to defendants from points outside the State of Florida.

"(4) There is a spur railroad track running into defendant's premises alongside their warehouse and storage areas, and the defendants frequently and repeatedly have received shipments in carload lots from outside the State of Florida on this spur

"(5) It was stipulated between the parties, and the Court so finds, that: (a) During the period from April 1, 1950, to June 13, 1951, the defendants received 575 carloads of ingredients and materials used in the manufacture of concrete block from points outside the State of Florida. (b) During

the period from April 1, 1950, to June 13, 1951, the defendants received rail carload shipments from sources outside the State of Florida each work week, and the average number of shipments received each week was 9.1 carloads. (c) All rail carloads of goods ordered and received from sources outside the State of Florida were received and unloaded by defendants' employes.

"(6) Since April 1, 1950, certain of defendants' employes have been regularly engaged in receiving, spotting and unloading rail carload shipments of ingredients and materials from sources outside the State of Florida, and in placing such items in defendants' storage facilities. Such activities were a regular and recurrent part of their duties and required a portion of their time in each work week.

Maintenance Man and Clerks

"(7) Since April 1, 1950, one of the defendants' employes has been regularly engaged in greasing and lubricating machinery and equipment used in unloading and storing shipments of ingredients and materials from sources outside the State of Florida. The performance of this duty was regular and recurrent and required a portion of his time each work week.

"(8) Since April 1, 1950, defendants' mechanic and maintenance man has been regularly engaged in maintaining and repairing machinery and equipment used in unloading and storing shipments of ingredients and materials from sources outside the State of Florida. The performance of this duty was regular and recurrent and required a portion of his time in each work week

"(9) Since April 1, 1950, the regular duties of defendants' bookkeeper have been to maintain records on the ingredients and materials received by defendants from sources outside the State of Florida, to receive, check and file invoices on such shipments, to keep accounts on and effectuate payment for such shipments, and to compute payroll records for defendants' employes and maintain such payroll records. Such duties were regular and recurrent and required a portion of his time each work week.

"(10) Since April 1, 1950, the regular duties of defendants' office clerk have been to type and mail letters destined for points outside the State of Florida, to make daily trips to the United States Post Office for the purpose of mailing defendants' correspondence, and to receive telephone calls from points outside the State of Florida. Such duties were regular and recurrent and required a portion of his time each work week.

"(11) It was stipulated between the parties, and the Court so finds, that: (a) Since April 1, 1950, defendants have paid some employes engaged in receiving and unloading shipments of goods from sources without the State of Florida, wages less than 75c per hour. (b) Since April 1, 1950, defendants have employed, and are employing, all of their employes, engaged in receiving and unloading goods from sources outside the State of Florida, and in maintaining records relating to such out-of-state goods, and in maintaining equipment used in unloading such goods, work weeks longer than 40 hours without compensating them for their hours in excess of 40 in a work week at rates not less than one and one-half times their regular rates of pay.

"(12) The Court judicially notices the record-keeping regulations promulgated by the Administration of the Wage and Hour Division pursuant to Section 11(c) of the Fair Labor Standards Act of 1938, as amended U.S.C.A. Section 211(c), which are Title 29, Chapter V, Part 516, of the Code of Federal Regulations.

"(13) Defendants have continuous ly, since April 1, 1950, until the time this cause came on for trial, failed to keep records in form and manner as required by the regulations referred to in paragraph (12) hereof.

Conclusions of Law

"(1) All of defendants' employes engaged in receiving goods from extra-state sources, in spotting and unloading rail cars, transporting such goods, and in placing such goods in storage, are engaged in interstate commerce within the meaning of the Fair Labor Standards Act of 1938.

"(2) Those of defendants' employes who are engaged in maintaining, repairing, greasing and lubricating machinery and equipment used in unloading and placing in storage goods received by defendants from extrastate sources are engaged in activities so closely related to the flow of interstate commerce as to be, in legal contemplation and as a practical matter. a part thereof. Such employes are thus engaged in interstate commerce within the meaning of the Fair Labor Standards Act of 1938.

'(3) All of defendants' employes who perform the necessary office and clerical work in connection with shipments of goods from extra-state sources are engaged in interstate commerce within the meaning of the Fair Labor Standards Act of 1938, whether they maintain records, type letters or utilize the telephone.

"(4) The percentage of an employe's time spent in covered work as compared to his total hours worked is of no consequence in the application of the Fair Labor Standards Act. Employes whose duties require a regular

(Continued on page 144)

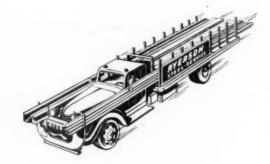


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the Personal Side of the news

Production Manager

GEORGE L. KIRP, formerly operations engineer of Marquette Cement Manufacturing Co., Chicago, Ill., has



George L. Kirp

been appointed general production manager of Material Service Corp., Chicago. A graduate of Purdue University, Mr. Kirp has been a prominent figure in the technical and operating fields of the portland cement industry for many years.

Association President

J. F. Hamilton of Dettling-Hamilton Co., Pittsburgh, Penn., was recently elected president of the Pennsylvania Concrete Burial Vault Association.

Leaves A.C.P.A.

WILLIAM A. HALEY III has resigned as assistant to Howard F. Peckwortn, managing director of the American Concrete Pipe Association, Chicago, Ill., to accept a position on the staff of the Southern Block and Pipe Co., Norfolk, Va.

Vice-President of Sales

Denald R. Sutherland, general sales musager of Carolina Giant Cement Co and Giant Portland Cement Co., Pt adelphia, Penn., has been elected vice-president in charge of sales. Mrs. Alice K. Zorn has been named assistant secretary.

Enginee Retires

THOMAS E. STANTON, engineer for the California State Division of Highways, has retired after almost 40 years of service to the state. He will be succeeded by F. N. Hveem, construction engineer. Mr. Stanton is the engineer who started the discussion on alkali in cement reaction with siliceous aggregates, several years ago, with a paper read at an annual meeting of the American Society of Civil Engineers.

Lehigh Promotions

ARNOLD J. JOHNSON, plant manager at the Mason City, Iowa, plant of Lehigh Portland Cement Co., Allentown, Penn., has been promoted to operating manager with headquarters at Allentown. He is succeeded at Mason City by George W. Hannaman, who has been plant manager at the Sandt's Eddy, Penn., plant since 1948. Alfred G. Metzger has been promoted



George W. Hennaman

from assistant plant manager to plant

manager at Sanot's Eddy.

Mr. Johnson graduated from Iowa
State College in 1933 with a B.S. degree in chemical engineering. He was
employed by Lehigh in 1935 for manufacturing research at the Ormrod
laboratory. In 1939, he was assigned
to the Alsen, N. Y., plant and was
made supervising chemist and engineer in 1940. In 1944, he was appointed combustion engineer in the Allentown office and two years later was
made plant manager at Mason City.

Mr. Hannaman, following his graduation from Iowa State College in 1937 with a B.S. degree in mechanical engineering, became associated with Lehigh as a draftsman at the Mason City plant. He was made plant engineer in 1938 and assistant plant manager in 1947. One year later he



Arnold J. Johnson

was promoted to plant manager at the Sandt's Eddy plant.

Mr. Metzger was graduated from Pennsylvania State College with a B.S. degree in fuel technology. After graduation he served with the U. S. Bureau of Mines. He joined the U. S. Navy and was commissioned a lieutenant (j.g.). After his discharge he joined Lehigh and took the operating department's training course. He was assigned to the Fogelsville, Alsen, and Sandt's Eddy plants in succession, and was promoted to plant engineer at Sandt's Eddy plants in succession, and remained to the service of th



Alfred G. Metzger

Joins Darden Industries

H. Nurse, a registered engineer in the state of New York, has joined Roy Darden Industries, Inc., Atlanta, Ga., where he will assist in promoting sales on the F & A floor and roof system in Georgia and North Florids, and will work with the F & A licensees on a nation-wide basis. A graduate of Cornell University, Mr.



H. Nurse

Nurse operated his own architectural and engineering office for several years, and has been a manufacturer of precast concrete and cast stone products for the past 25 years. He is the originator of precast shale-faced, natural colored flagstone, and has had wide experience with the F & A floor and roof system. Announcement has also been made of the addition of the Universal Cast Stone Co., Charleston, W. Va., as licensee, with Claude Fisher as president; Harold C. Melton, Jr., as treasurer and general manager; and Earl Flesher, formerly with Marietta Concrete Products Co., Marietta, Ohio, as superintendent in charge of plant operations. Ben Lange, C. F. Moore and Larry Condrey are licensees for the F & A floor and roof system in the greater Chicago area, and are forming a new company to handle this system in North Chicago.

Win Safety Award

W. K. NIEMANN, president of the Des Moines Safety Council, delivered a congratulatory address recently to employes of the Des Moines, Iowa, plant and quarry of Marquette Cement Manufacturing Co., Chicago, Ill., on the outstanding success of their safety program which has carried the plant through 3½ years

without a single lost-time accident. In recognition of this achievement, and also for an accident-free record in 1950, the plant was reawarded the Portland Cement Association's safety trophy which it first won in 1943. Officials present at the ceremonies were I. F. LeGore, assistant manager of the Accident Prevention Bureau of the P.C.A., who made the presentation; W. E. Erwin, manager of industrial relations, Marquette Cement Manufacturing Co., who introduced Mr. Niemann; and R. L. Price, plant safety supervisor and chairman of the program.

Moves Office

HERBERT H. LAUER, consulting industrial and cement plant engineer, has moved his office from Philadelphia, Penn., to 1008 East Central Ave., Orlando, Fla.

Assistant Manager

ALFRED D. HARDEGREE, a sales representative in the Dallas, Texas, branch of The Celotex Corp., Chicago, Ill., has been named assistant manager of the branch.

Plant Manager

FRED ROBINSON has retired as plant manager of the Duluth, Minn., plant of Universal Atlas Cement Co., New York, N. Y., and will be succeeded by Martin E. Linquest, who has been assistant plant manager since 1943. Born in Sweden, Mr. Robinson received his grade and high school education in Chicago, where he studied civil engineering. He joined the civil engineering department of the Illinois Steel Co. in 1905 and later, in that capacity, took part in the construction work of two of the cement mills at the



Martin E. Linquest



Fred Robinson

Buffington, Ind., plant of Universal Atlas Cement Co. In 1913 he was engineer of construction at the cement company's Duluth plant and in 1915 became assistant superintendent of that plant. He was appointed plant manager in 1943. Mr. Linquest joined the company as a tester at the Buffington plant in 1907. He was made a clerk in the machine shop in 1909 and became employment and safety inspector in 1917. Two years later he was promoted to operating foreman, Duluth plant, and received his appointment to assistant plant manager in 1943, which position he has held until his present appointment.

On Agricultural Board

RODNEY G. KAUFFMAN, sales manager at the Fairborn, Ohio, plant of Southwestern Portland Cement Co., Los Angeles, Calif., has been appointed to the board of directors of the Greene County Agricultural Society to represent the city of Fairborn.

Manages Block Plant

E. L. Coggins has been appointed manager of the Midland plant of the Texas Concrete Block Co., Lubbock, Texas, which is soon to be erected. He was formerly manager of the Abilene Conotex Concrete Building Block Co., and is to be succeeded in this position by John W. Barton, who was manager of Thomas and Co., Corpus Christi, Texas.

General Manager

CHARLES F. DEAN has been promoted to general manager of Broward Quarries, Inc., Fort Lauderdale, Fla., Walter B. Colby has been appointed assistant general manager, and Warren MacGregor has been named sales manager.

Marquette Appointments

JAMES H. Howe, who has been superintendent at the Cape Girardeau, Mo., plant of Marquette Cement Manufacturing Co., Chicago, Ill., for the past seven years, has been appointed assistant director of operations with headquarters in Chicago. He has been associated with the plant since 1923. Karl V. Hauser of the Des Moines plant staff, who has specialized in the study of kiln and grinding operations since joining the company in 1948, has been appointed technical assistant on the operations department staff. He will also have his headquarters in Chicago. Fred Nicholas, general foreman at the Cape Girardeau plant, where he has served since 1923, has been named to succeed Mr. Howe as superintendent of the plant.

Elected Vice-President

ALBERT A. MASICK, owner and manager of the Masick Soil Conservation Co., Schoharie, N. Y., was elected vice-president of the Associated Limestone Producers of the Northeast, Inc., at the annual meeting in Albany, N. Y. Nicholas Farber, president of the Farber White Limestone Co., Franklin, N. J., is president of the association.

Elected a Director

FRED A. MANSKE, vice-president in charge of production for the National Gypsum Co., Buffalo, N. Y., has been elected a director of the company. He succeeds Edwin F. Guth, who has resigned. Mr. Manske has been associated with the company since 1934.

Discusses Safety

ROBERT M. Cox, assistant secretary-treasurer of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., discussed the topic, "Why Do Accidents Happen?" at an industrial safety institute for employes and management of industrial plants held recently in Chanute, Kan., under the sponsorship of the Chamber of Commerce and the University of Kansas extension division.

On Mission to Brazil

DR. WILLIAM B. MATHER, chairman of mineral technology, Southwest Research Institute, has been granted leave of absence by the Institute to participate in an economic mission to Brazil for the U. S. State Department. Dr. Mather, who will be the mission's adviser in the fields of industrial technology, mineral resources and research, explained that the mission was undertaken as part of the Point Four program, which seeks to assist in the economic development of nations friendly to our country by providing them with the technical "know-how to better utilize their own natural resources. It is called the United States-Brazil Joint Commission for Economic Development. In Dr. Mather's absence, John Funnell, supervisor of



Dr. William B. Mather

ceramic engineering for Southwest Research Institute, will direct the mineralogical work for the nonprofit scientific research laboratories.

OBITUARIES

RALPH E. GIBSON, owner of the Gibson Block and Cement Co., Carlis'e, Penn., died suddenly on August 12 while visiting relatives in Buchanan Valley, Adams county. He was 45 years old.

SAMUEL HILL CLARK, president and general manager of the Carolina Concrete Pipe Co., Charlotte, N. C., passed away on August 11 at his home in Lilesville, N. C. He was 59 years old and had been in ill health for several years. Mr. Clark was a veteran of World War I, and served with the 81st Infantry division. At the close of the war, he organized the Anson Brick and Tile Co., which later became Carolina Concrete Pipe Co.

OSCAR HENRY SCHMIDT, owner and operator of the Schmidt Concrete Products Co. and the contracting firm of Oscar H. Schmidt, Inc., St. Joseph, Mo., died recently at the age of 66. A pioneer in the concrete block industry in that area, Mr. Schmidt had been in the building field in St. Joseph since his graduation from the Missouri University school of engineering in 1907. He also built the Haydite processing plant at New Market, Mo. A son, Richard Lee Schmidt, operates the Capitol Concrete Products Co. at Topeka, Kan.

HARRY K. LANGE, retired vice-president of Western Mineral Products Co., Minneapolis, Minn., died August 21. He was 73 years old. Mr. Lange joined the company as advertising manager shortly after it was organized in 1936 and became vice-president in 1946. He was also publicity director of the Vermiculite Institute, Chicago, Ill., until his retirement in 1949, Mr. Lange was a well-known contributor to trade magazines. Two of his articles were published in the 1945 and 1946 issues of Rock Products. He received national recognition for some of the consumer sales letters he originated, one of which appears as a model in a current college textbook.

LLOYD G. HENRY, secretary and treasurer of the Giant Portland Cement Co., Philadelphia, Penn., d'ed August 6 after collapsing at his desk in the firm's offices. He was 62 years of age. Mr. Henry joined the company in 1917 in Norfolk, Va. He was also a director of the company and of the subsidiary, Carolina Giant Cement Co.

JOHN L. ROE, chairman of the board and former president of the Cummer Lime and Manufacturing Co., and the Cummer Sons Cypress Co., Jacksonville, Fla., passed away on August 6 after a long illness. He was 76 years of age. A native of Madison, Ind., Mr. Roe received an engineering degree from Purdue University in 1896. After graduation he worked for the General Electric Co. in Schenectady, N. Y., and Atlanta, Ga. He went to Jacksonville in 1905 as president of the Florida Electric Co.

RAND C. FLETCHER, vice-president of the Flint Crushed Gravel Co., and vice-president of the Iowa Limestone Co., Des Moines, Iowa, died suddenly from a heart attack at his home recently. Mr. Fletcher was one of the pioneers in the sand and gravel industry and one of the founders of the National Sand and Gravel Association, serving as president in 1928 and 1929.

WILLIAM GLENN SPICER, co-owner with his brother, John, and his mother, Mrs. Louise Spicer, in the Spicer Gravel Co., Marseilles, Ill., died on August 20 in Hines Hospital, Chicago, Ill., from injuries received when a truck box fell on his shoulder, injuring his spine. The accident occurred as he was making minor repairs underneath an elevated box on the back of a truck at the firm's gravel pit between Marseilles and Seneca, Ill. Born in Marseilles, Mr. Spicer studied electrical engineering at the University of Illinois for three years. He had been in the gravel business, founded by his father many years ago, for more than 28 years.

George Krier, president, Nailable Cinder Block Co., Brooklyn, N. Y., and past-president of the National Concrete Masonry Association, Chicaco, Ill., passed away August 9.

"...ENGINE STILL IN EXCELLENT CONDITION AFTER 7,000 HOURS' OPERATION THANKS TO TEXACO URSA OIL X**"

Taken down after 7,000 hours of rugged service in a rock quarry, this Caterpillar Diesel D-7 bulldozer engine was in excellent condition. Piston rings were all free, wear was so negligible that the crankshaft was reinstalled without any work having to be done on it. Texaco Ursa Oil X** was used exclusively in this record achievement.

Texaco Ursa Oil X** is detergent and dispersive, it keeps engines clean . . . free from harmful carbon, gum and sludge. This, plus a high resistance to oxidation keeps rings free, ports open, valves functioning properly for better compression and combustion. Texaco Ursa Oil X** assures full protection for bearings . . . less wear . . . reduced maintenance costs and fuel consumption.

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Three Other Texaco Cost-savers

- Texaco Martak Tough, adhesive and cohesive, assures longer life and lower maintenance costs for chassis parts.
 Over 400 million pounds of Martak have been sold!
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Aeriel view of Marquette Cement Manufacturing Co.'s Des Moines, Iowe, plant shows enlarged production facilities, including a new 475-ft. klin. Since expension the plant now produces on additional 500,000 bbl. of coment annually

N.S.G.A. and N.R.M.C.A. Convention

THE 26TH ANNUAL CONVENTION of the National Sand and Gravel Association and the 22nd annual convention of the National Ready Mixed Concrete Association will be held concurrently at The Stevens Hotel, Chicago, Ill., the week of February 11, 1952.

A feature of the convention will be an exhibition of machinery, equipment and supplies used in the two industries. The exhibit is being designed particularly to appeal to the superintendents and operating men, as well as to the yeung men who want to get a glimpse of what the future holds for the production, distribution and use of sand and gravel and ready-mixed concrete.

Safety Manual

THE NATIONAL SAFETY COUNCIL, Chicago, Ill., has issued its second edition of "Accident Prevention Manual for Industrial Operations." Popular response to the first edition, issued four years ago, was so great that work was begun immediately on an expanded second edition.

The new manual contains 800 pages and is confined principally to safety in the manufacturing industry and is based on the premise that a major proportion of all accident causes are common to all industry. Subjects covered include permanent structure and plant layout; maintenance and maintenance crews; boilers; pressure vessels; machine guards; materials-handling hazards; hand and portable power tools; welding and cutting; electrical hazards; fire prevention

and control; personal protective equipment; medical services in industry; safety organization and training; accident records, analysis and costs. One of the new sections, "The Safety Man's Resources," is a bibliography of safety organizations and publications.

After the first edition was published there was a big demand for certain parts of the book for use by supervisors, crew leaders and others in the foremanship group. Reprints of the various sections of the second edition have been bound in paper and may be purchased separately. Detailed description and price may be obtained by writing to the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

Electrostatic Separator

THE BUREAU OF MINES recently an onunced the development of a universal type electrostatic separator which can be adjusted to meet the metallurgical testing requirements of all varieties of ores. Unlike current equipment which can be utilized only in the testing of a relatively narrow range of minerals, the Bureau of Mines states that the newly-developed separator permits the investigation of such electric and mechanical properties of ores as conductance, contact potential, dielectric constant and particle shape.

A report, presenting detailed description of the separator and describing specific applications, including a full-page photograph and engineering sketches, has been prepared by Foster Fraas, Bureau metallurgist, and Oliver C. Ralston, Bureau chief metallurgist. Free copies of Report of Investigations 4766, "Universal Type Electrostatic Separator," may be obtained by writing to the Publications Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Penn.

Safety Achievement

THE INGERSOLL QUARRY division of North American Cyanamid, Ltd., Ingersoll, Ont., recently completed 600,000 man-hours, a total of four years, without a disabling injury. The employes, numbering about 75, were formally honored with an "Ingersoll Quarry Safety Appreciation Day," in recognition of their outstanding industrial record.

At the quarry 1800 tons of limestone are mined daily to provide basic materials for the manufacturing operations of North American Cyanamid, Ltd., Niagara Falls, Ont., plant and Welland Works.

Plant Expansion

ASH GROVE LIME and Portland Cement Co., Kansas City, Mo., has been given defense production administration approval for a \$3,322,700 expansion at its Louisville, Neb., plant, to manufacture carbon black, a synthetic rubber ingredient.

New Limestone Plant

NORTH ARKANSAS LIME Products Corp., formed by Sterlin Hurley, Aubrey Hickenbottom and Ralph Estes, recently began operations at its new plant near Bellefonte, Ark., for the production of agricultural limestone and two grades of chat, fine and coarse. Limestone produced by the new corporation meets the P.M.A. requirements and will be distributed over an 8-county area. The plant is now producing approximately 200 t.p.d. with the peak production expected to reach 250 tons. Plans are being made for the addition of more storage facilities, and its fleet of six trucks is to be increased to ten.

Phosphate Bulk Plant

KILKENNY LIMESTONE Co. recently added a rock phosphate bulk plant to its West Plains, Mo., operations. The plant is engaged in the production of fertilizer from rock phosphate.

Fluorspar

HIGH GRADE FLUORSPAR is reported under development in the Needle Peak property 50 miles southeast of Battle Mountain, Nev. The property was lead a few months ago by Ford T. Frost of Ogden, Utah.

Perlite Production

GREAT LAKES CARBON CORP., New York, N. Y., recently celebrated the production of its 2,000,000th 4-cu. ft. bag of Permalite, at its Linden, N. J., plant. The company claims that this is an industry record for any one perlite manufacturer.

Official records for the perlite industry, recently released by the Perlite Institute, show that production in



Great Lakes Carbon Corp. produces its 2,000,-000th 4-cu. ft. bag of periite. Left is Donald H. Gott, general sales monager; right, Betty Tunnell. "Miss Parmelite. 1951"

the last 2½ years of operation has increased over 400 percent and is continuing a sharp upward incline. To-day, with the critical steel shortage, perlite is contributing to the defense effort by helping to conserve structural steel. It is claimed that in a multi-story building, the use of perlite in concrete and plaster can account for as much as an 80 percent saving in dead load, and most of the saving would be in structural steel.

Great Lakes Carbon Corp. also operates a perlite plant at Torrance, Calif. Permalite brand perlite is produced in various parts of the United States by Permalite licensees.

Portland Cement Production

THE PORTLAND CEMENT industry produced 22,439,000 bbl. of finished cement in July, 1951, as reported to the Bureau of Mines. This was an increase of 8 percent compared with the output in July, 1950. Mill shipments totaled 24,226,000 bbl., an increase of 5 percent over the July, 1950, figure, while stocks were 14 percent above the total for the same month in 1950. Clinker production during July, 1951, amounted to 21,-440,000 bbl., an increase of 8 percent compared with the corresponding month of the previous year. The output of finished cement during July, 1951, came from 152 plants, located in 36 states and Puerto Rico. During the same month of 1950, 20,709,000 bbl. were produced in 148 plants.

Short Course

THE SIXTH ANNUAL SHORT COURSE for technicians of the sand and gravel and ready-mixed concrete industries has been tentatively scheduled for November 12-16, 1951, to be held at University of Maryland, College Park, Md.

Company Insurance

NATIONAL GYPSUM Co., Buffalo, N. Y., in the 12 months ended June 30, 1951, paid out \$228,800 to employes and their families under the "packaged insurance plan." It was the first year that the plan was in operation.

Portland Cement Paint

THE New Zealand Portland Cement Association recently published Bulletin No. AC1, entitled "Portland Cement Paint." Among the topics covered in the booklet are: age of concrete to be painted; paint versus plaster; appropriate usage; cleaning of surfaces; wetting of concrete surface prior to painting; portland cement paint composition; notes on paint ingredients; and typical form of specification for portland cement paint. Copies of the booklet may be obtained from New Zealand Portland Cement Association, C.P.O. Box 969, Wellington, C.1, New Zealand.

Coming Conventions

October 8-12, 1951—
National Safety Congress and Exposition, The Stevens, Palmer House, Congress, Morrison and La Salle Hotels, Chicago, III.

October 17-19, 1951— National Industrial Sand Association, Semi-Annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

October 22-24, 1951—
American Society for Testing Materials, Committee C-1 on Cement and Committee C-9 on Concrete and Concrete Aggregates, Joint Meeting, Purdue University, Lafayette, Ind.

October 30-31, 1951— American Concrete Institute, Regional Meeting, Sheraton Hotel, St. Louis, Mo.

November 4-7, 1951— National Concrete Masonry Association, Southern Regional Meeting, Roosevelt Hotel, New Orleans, La.

November 14-15, 1951— National Slag Association, Annual Meeting, Knickerbocker Hotel, Chicogo, III.

November 26-27, 1951— National Association of Silo Manufacturers, Annual Convention, Palmer House, Chicago, III.

November 26- December 1, 1951— Chemical Industries

Chemical Industries Exposition, 23rd Exposition, Grand Central Palace, New York, N. Y.

January 15-17, 1952— National Agricultural Limestone Association, 7th Annual Convention, Hotel Statler, Washington, D. C.

January 16-17, 1952— Wisconsin Concrete Products Association, 32nd Annual Convention, Plankinton House, Milwaukee, Wis

January 21-24, 1952— American Road Builders' Association, 50th Anniversary Meeting, Rice Hotel, Houston, Texas.

February 11-15, 1952— National Sand and Gravel Association, 36th Annual Convention and Exhibit, The Stevens, Chicago, III.

National Ready Mixed Concrete Association, 22nd Annual Convention and Exhibit, The Stevens, Chicago, III.

February 18-20, 1952— National Crushed Stone Association, 35th Annual Convention and Exhibit, The Stevens, Chicago, III.

Agricultural Limestone Institute, 7th Annual Convention, The Stevens, Chicago, III.

February 18-21, 1952— American Institute of Mining and Metallurgical Engineers, 79th Annual Meeting, Hotel Statler, New York, N. Y.

Agstone Advisory Committee

THE AGRICULTURAL LIMESTONE IN-STITUTE recently announced that the Office of Price Stabilization has taken its first step towards a ceiling price regulation "tailored" especially to fit the needs of the agricultural liming materials industry, by holding a meeting with the Industry Advisory Committee. The purpose of the meeting was to advise and consult with staff members of O.P.S. on pricing problems created by the General Ceiling Price Regulation which became effective last January 26. It was reported that the meeting was most helpful both to members of the Industry Advisory Committee and the staff of O.P.S. However, certain questions remain to be fully answered before final actions can be taken by O.P.S. Any industry member having a particular pricing problem was urged to present his problem to the committee member located nearest him so it can be discussed at the next meeting.

The advisory committee consists of P. E. Heim, vice-president of sales, The Carbon Limestone Co., Lowellville, Ohio; Russell W. Hunt, president and general manager, Southwest Lime Co., Neosho, Mo.; K. K. Kinsey, secretary, Concrete Materials and Construction Co., Cedar Rapids, Iowa; H. C. Krause, president, Columbia Quarry Co., St. Louis, Mo.; Ralph S. McCrea, vice-president, West Michigan Dock and Market Corp., Muskegon, Mich.; George W. Mintz, manager, Michigan Limestone and Chemical Co., Buffalo, N. Y.; Verne C. Morgan, vice-president and treasurer, Kentucky Stone Co., Inc., Louisville, Ky.; Robert M. Patton, assistant ex-ecutive vice-president, Plum Run Stone Division, New York Coal Sales Co., Columbus, Ohio; Russell Prall, president, Rush County Stone Co., Milroy, Ind.; John H. Riddle, president and general manager, Riddle Quarries, Inc., Marion, Kan.; K. C. Ruedebusch, secretary-treasurer, Mayville White Lime Works, Mayville, Wis.; Vincent H. Shea, president, Hoosac Valley Lime Co., Inc., Adams, Mass.; D. K. Shroyer, sales manager, H. E. Millard Lime and Stone Co., Annville, Penn.; Burt F. Taylor, president, Cowan Stone Co., Cowan, Tenn.; and R. T. Willingham, president, Willingham-Little Stone Co., Atlanta, Ga.

Purchases Perlite Plant

TENNESSEE PRODUCTS AND CHEMICAL CORP., Nashville, Tenn., recently purchased the perlite plant of Muehl-Lite Corp., North Little Rock, Ark., and also has announced plans to build a new plant for the production of lightweight aggregate in Jackson-ville, Fla. In addition, the company operates perlite and mineral wool plants in Nashville, Tenn.



Florida Phosphate Division of International Minerals & Chemical Corp. stockpiles wet phosphate rock, by grede, with use of Allis-Chalmers HD-19 tractors. Stockpiling of wet phosphate rock provides a buffer between continuous mining operations and fluctuating shipping requirements

Agricultural Appropriations

THE SENATE, on August 20, 1951, took final action on the conference report with respect to the Agriculture Appropriations Bill (H.R. 3973), the House having taken such action previously. Two items resolved by the committee of conference and accepted by the House and conference were as follows: (1) 1951 appropriation—\$256,000,000; (2) 1952 appropriation—\$256,500,000.

Both figures are higher than previously approved by the House and lower than the sums advocated by the Senate. The sums appropriated and authorized should assure a continuation of a fairly substantial conservation program.

Plant Expansion

NORTH AMERICAN CYANAMID, LTD., recently secured an option to purchase 97 acres of land immediately adjoining its limestone quarry at Ingersoll, Ont., to insure a long-term supply of limestone in its manufacture of fertilizer, chemicals, plastics and drugs.

To meet production requirements created by the company's \$4,000,000 expansion program at the Niagara Falls, Ont., plant and Welland Works, it was indicated by A. O. Williams, vice-president and general manager, that employment at the Ingersoll quarry would be increased and machinery installed to facilitate production.

Asbestos

PHILLIP CAREY Co., Cincinnati, Ohio, recently began diamond drill testing of the Stark asbestos property 18 miles northeast of Nevada City, Nev. The government has authorized expenditure of more than \$16,000 on the exploratory project, with the loan to be repaid after mining operations have been started. An extensive de-

posit of commercial grade asbestos has been indicated by exploratory and development work near the surface. If the drilling program indicates a substantial depth of the deposit over a fairly broad area, large scale operations are planned. The Stark deposit was worked profitably during World War I, but has been idle since that time. Phillip Carey Co. became interested in the mine during its research for dependable sources of commercial grade asbestos in the West.

Cement Storage Plant

THE PUERTO MARINE CORP. of Puerto Rico, which has shipped hundreds of thousands of bags of cement to Florida during the past several months, has announced it will build a cement storage and bagging plant at Port Everglades, Fla.

Cement in bulk will be transported in ships from the company's plant in Puerto Rico and pumped through pipe, lines into storage silos. An adjoining plant will bag it for market. Jose A. Ferre, president of the company, stated that the new operations would reduce the cost of cement for south Florida concrete producers.

Agstone Consumption

MISSOURI LIMESTONE PRODUCERS ASSOCIATION recently reported that the State P.M.A. Committee and the Missouri College of Agriculture have raised the original figures on tons of agricultural limestone used on Missouri farms during the calendar year of 1950. The preliminary summary showed that a little less than 3,000,000 tons were used in 1950. The final figures, which are the ones that will be considered official by U.S.D.A., show that Missouri's tonnage last year was 3,500,000, an increase of about 100,000 tons over the best previous year, 1947.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Wallboard Cover for Belt

AT A LARGE DAM construction job in the middlewest, aggregates are delivered to the contractor who stockpiles



Belt conveyor protected from weather conditions by wallboard wings

the material in a conventional outside storage pile and reclaims with a belt conveyor. Weather conditions in this locality, especially winds, are often quite severe, so the operator enclosed his conveyors in housings, the sides of which are made of wallboard. "Peep-holes" at regular intervals permit the necessary inspections.

Safe Storage of Explosives

AT AN UNDERGROUND MINE where magnesium limestone is mined, the storage of explosives for this work is in a steel structure of modern design, as shown in the illustration. The boxes of explosives are piled with a wooden pallet under the bottom of



Wooden pallet under each rew of boxes permits adequate circulation around explosives

each row to allow adequate circulation around the explosives. No crowding is apparent. Many powder magazines are an improvised hole in the ground that one enters with reluctance, but the one shown here is an example of good and safe housekeeping at a vital spot.

Removing Clay from Gravel

AS A GENERAL STATEMENT, gravel in the southern states is small in size and often is accompanied with variable amounts of clay. The opera-tion that one producer uses to remove clay, described here, is not new but, for the benefit of the up and coming generation of gravel producers, the scheme is outlined here. A 400-hp. Emsco dredge pump excavates the material and delivers it about 750 ft. to discharge back into the pond. At the unloading point a 150-hp. Emsco pump picks up the material a second time and puts it over the stationary screen. The oversize goes into a gondola and the fines can go either to waste or to settling boxes. Here the sand is wasted, for the company has another dredge pump to handle sand.

If the clay content in the gravel is too high to meet specifications, the



Rehandling pump discharges gravel back into pend

gondola is hauled a short distance and unloaded to ground storage where the material is spread out somewhat. The basic purpose of the ground storage is to allow the clay particles to soak in the damp pile. Possibly 300 ft. from the storage pile is a second screening plant.

The scheme of operation then is to push the gravel towards the second plant with a Caterpillar tractor and blade, delivering it the maximum distance afforded by the stockpile set-up. In pushing the gravel, considerable attrition, or rubbing together, of the particles takes place. The greater the

distance pushed, the more the clay is disintegrated. Here the maximum distance is about 600 ft. The material is delivered to a hopper serving a belt conveyor to the second plant where it is re-screened over a stationary screen.

Drill Platforms for Underground Mining

UNDERGROUND LIMESTONE MINES are quite common in the rock products industries and where stripping is





Top: Platform is hoisted to place by tugger oir-hoist. Bettom: Drill platform mounted on front end of truck, at ground elevation

heavy, limestone can be excavated at a cost competitive with open-pit mining. In the mines where the "room and pillar" system of mining is used, drill jumbos of various types are used. At one mine inspected, a drill platform, hung from the lip of a \S_b -cu, vd. shovel, was used; another mine operation used a drill jumbo, or portable platform on which one or more drills could be mounted. The latter was factory produced and ran into a considerable investment.

One crushed limestone operator in the mid-south rigged up his own jumbo, assembling it on the front end of an old unused truck. The platform carried two heavy drifters. The "backs," or roof of the room was 26 ft. from the floor and the rooms were 50 x 50 ft. with pillars of the same size. The platform from which the drills were operated was hoisted to its place of use by a small tugger airhoist mounted on the front end of the truck. A miner and a helper ran the two drills.

HINTS AND HELPS

Drives for Roll Crushers

OLDER TYPES OF drives for doubleroll crushers involved flat belts—one
being a cross belt—and were operated
from a jack-shaft. This was necessary
as the two rolls revolved in opposite
directions. The set-up was costly,
cumbersome and took up much space.
Another set-up was the use of socalled "star" gears on the outboard
end of each roll shaft. These gears
permitted opening or closing of the
space between the face of the gears,
and the rolls could be driven by a single motor without cross belts.

A third type of drive involves the use of a geared motor and V-belts direct to each roll shaft. The main difficulty to be overcome in this type of drive is that of vibration. An oversized piece of feed rock will often cause the rolls to "jump." With a geared motor and a short V-belt, this shock is imparted to the motor assembly. The average geared motor is not designed for such rough service and broken gears may result.

At an eastern operation, the original set-up involved a single-roll crusher to crush cinders and other lightweight aggregates. The ratio of reduction was high. Sterling geared motors and chain drives were used. The rolls passed the shock back to the motors which resulted in high maintenance costs. A second set of rolls was then installed, thereby reducing the ratio of reduction, and this alone eliminated much of the trouble. However, in the second installation, two U. S. geared motors were V-belted with relatively long belts to each of the secondary rolls. With the longer V-belts, much of the shock is absorbed by the belts. (A magnet ahead of the primary rolls is usually advised). The assembly now is operated with low maintenance cost to both types of motors and drives

Gallery Supports

SUPPORTS FOR BELT conveyors and transfer towers can take a wide variety of forms. The ones shown in the illustration are not only neat and at-



Reinforced concrete columns support belt conveyor and transfer tower





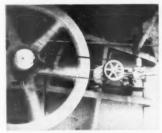
Left: First of two sets of rolls, driven by goared motors and heavy roller chains. Right: Second set of rolls involves use of two motors and long V-belts

tractive, but are relatively inexpensive to construct and, being of reinforced concrete, should have a long

The inclined belt carries a minus 6-in. product to a transfer tower and thence to a surge pile. The four legs of the transfer tower give stability to the inclined structure and solve any problems relating to wind velocities in the area. The columns are square and about 20 x 20 in. in cross section. A walkway on both sides of the belt makes inspection easy.

Water-Cooled Bearings

WATER FOR COOLING large bearings must be positive and, when the bearings are new and tight, the water



Pump for water-cooled bearing of primary crusher

must also have sufficient pressure to do an adequate job. One method successfully used by a Kentucky crushing plant on a 36- x 42-in. jaw crusher comprised a one-cylinder piston pump having a cylinder about 1 in. in diameter. It was driven through a suitable mechanism by a V-belt, with the power source being from the extension of the crusher's main drive shaft. Water was delivered to the suction of the pump from a steel supply tank mounted about 10 to 12 ft. above the pump. The assembly was so mounted that it could be inspected easily and it made a neat and effective cooling unit.

Idler Base Construction

A METHOD OF MOUNTING carrier rolls that is novel, and which appears to have some advantages, is shown in the illustration. The conveyor is a 30-in. Hewitt-Robins belt riding Link-Belt idlers. The longitudinal frame is 8-in. channel iron with welded flanges bolted together to join long sections. The idlers are supported on 11/2- x 12-in, boards held down with two 1/2in. bolts at each end. The bolts are J-shaped and hook under the channel iron, thereby making it unnecessary to bore holes in the channels. Use of this type of bolt permits easy shifting of the idlers to get the belt to ride properly. Once the idlers are in running position the wood bites into the frame sufficiently to hold them true. A walkway is on both sides of the conveyor and wind guides are round iron members spanning over the belt on about 25-ft. centers. The belt delivers to a surge pile which in turn serves a crushing plant.

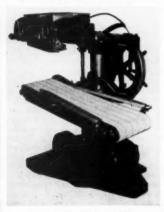


idiers are supported on $1\frac{1}{2}$ x 12-in. boards, held down with two $\frac{1}{2}$ -in., J-shaped boilts which hook under channel iron

New Machinery ROCK

Bag Closing Unit

HAMER MACHINE Co., Minneapolis, Minn., has developed a completely automatic bag closing machine said to be capable of closing up to 2000 paper bags per hour. An arrangement of chain drives compresses the neck of the bag, then seals it with 12-, 14- or 15-gauge metal wire. The unit is powered by a 1/2- or 1-hp. electric motor (optional), and is produced in five models, each designed for bags within specific capacity ranges.



Automatic bag closing machine

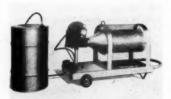
Portable Aggregates Plants

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has designed Mod-els 24V and 25V portable duplex plants, both employing the principle of bottom deck feed. They are said to

offer greater screening area and to permit balanced crusher loads through adjustment of the jaw crusher setting. The two plants are identical except for the size of the jaw crusher; the 25V has a 10- x 36-in. jaw and the 24V a 10- x 24-in. unit. Both models are equipped with a 24- x 16-in. double roll crusher, and are fed with swivel type field conveyor with a 24in. mechanical (reciprocating plate) feeder. Delivery of sized material is handled by a 24-in. x 25-ft. channel frame conveyor. It is said that the plants are designed especially for use in areas of restricted highway load limits where, in spite of such weight limitations, reasonably high production of aggregates is required.

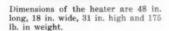
Radiant Heater

ARTHUR C. BAUMANN, Philadelphia, Penn., is manufacturing a portable "Eco-Temp" oil-fired radiant heater for any temporary or permanent application. The heater burns No. 2 fuel oil on a high-combustion basis, and requires regular 110-volt, 60-cycle,



Oil-fired radiant heater

single phase electrical connection. Fuel is supplied through hose of any length attached to the fuel oil drum.



Extends Diesel Line

GENERAL MOTORS CORP., Truck & Coach Division, Pontiac, Mich., has extended its line of diesel trucks and



New design diesel engine

highway tractors with an engine which is said to have more power, greater economy and performance and longer life. Built to haul a million miles or more, the diesel is a new design of the 4-71 and 6-71 engines, and will power the GMC 650, 740, 750, 900, 950 and 970 series trucks and tractors. Horsepower in the 4-cylinder engine has been boosted to 150 b. hp., as compared to 133 in the former model, while the 6-cylinder engine has had 25 extra hp. built into it, now being 225 b. hp. Additional features are: a fuel modulator incorporated in a new governor assembly; a camshaft which keeps valves open through a greater portion of the shaft revolution; no head gasket; a stronger crankshaft; a Houde viscous damper; and heavy-duty copper-lead bearings for crankshaft and connecting rods.

Conveyor Idlers

TRANSALL INC., Birmingham, Ala., is manufacturing a complete line of prelubricated belt conveyor idlers which are said to require no further lubrication. The company reports that the special sealed-in lubricant operates with little change in viscosity from -90 to 200 deg. F., and gives an almost constant idler friction factor throughout this temperature range. Idler frame construction is all-steel jig welded and the roll shafts are solid, extend completely through the idler roll and are mounted to eliminate all cantilever loading on the roll ends.



Portable duplex aggregates plant

Indicator and Control Units

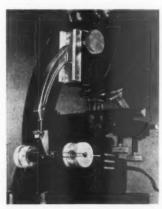
BAILEY METER Co., Cleveland, Ohio, has developed a line of miniature indicators and control units under the trade name of Mini-Line. It is planned to mount these instruments on console-type centralized control panels whenever possible, for they are said to be more than 50 percent smaller than any previously available. The line includes a multi-point indicator, selector valve and remote manual relay.

Screen Heater

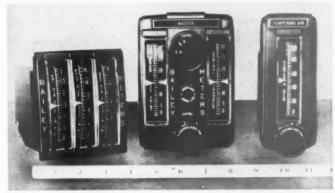
F. R. HANNON & SONS, Canton, Ohio, originally developed an electric screen heater to facilitate screening of moist clay used in brick and tile manufacture. However, the company reports, the unit is finding increasing use for speeding up screening of sand, coal, lime, ores and chemicals. Applicable to woven wire screen, No. 2 mesh or smaller, the heater consists of a step-down transformer which converts 220-, 440- or 550-volt alternating current to low-voltage heating current. The screen, it is said, acts as resistance to flow of the low-voltage current and is heated just enough to reduce the moisture content of the material as it passes over the mesh. As a result the material is said to pass more readily through the mesh, and filling of the openings is reduced.

Laboratory Microscopes

BAUSCH & LOMB OPTICAL Co., Rochester, N. Y., has developed a line of laboratory microscopes featuring ball bearings and rollers throughout the focusing system. Called Dynoptic Labroscopes, the new instruments also feature a low position fine adjustment and a mechanical stage with low controls. Optical equipment includes a longer working distance and non-divisible 10x achromatic objective.



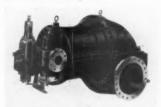
Microscope with low position fine adjustment



Multi-point indicator, selector valve and remote manual relay

Mechanical-Drive Turbines

GENERAL ELECTRIC Co., Schenectady, N. Y., has developed a line of multistage, mechanical-drive turbines in ratings from 200 to 5000 hp. Designated as Types DP, DR, DRV and DRVX, the new units have been designed to cover a wide range of industrial applications, as well as for power-generation purposes.



One of a line of multistage steam turbines

Transformer Welder

AIR REDUCTION SALES Co., Division of Air Reduction Co., Inc., New York, N. Y., has announced the availability of a new 200-ampere transformer welder, Model MCM, designed for general maintenance and production welding. Four variations are available: 220-volt or a 220/440/550-volt unit, each with or without power factor correction. Two open circuit voltages are provided—80 volts on the low range and 55 volts on the high range, claimed to combine easy arc starting with a lower kv.-a. demand load and primary ampere current.

Air Quenching Cooler

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., has applied improvements to its air quenching cooler, which are said to reduce preventive maintenance, simplify liner replacement and provide greater body rigidity. The grease lubricated rod bushings have been eliminated from

the travel control spring assembly, and as a result only the drive mechanism need be lubricated. Other advancements to the feed end portion of the cooler include the substitution of a three-piece liner for the two-piece liner; a reinforced body to prevent side warpage and give support to the side plate and end liners, and a cast iron baffle to improve the connection between the air quenching cooler body and the housing.

Interval Timers

THE TORK CLOCK Co., INC., Mount Vernon, N. Y., has revised its line of single-set timers for commercial and industrial service. These timers may be had for either permanent installation or for portable use with cord and plug. Portable plug-in models are rated 6 or 15 amperes. Switches have heavy-duty contacts of either 20 or 30 amperes capacity. The timers are enclosed in baked enamel cases, 41/2 x 3 x 3 in. Various time cycles are available ranging from 60 min. to 24 hr. Additional features such as pilot lights, a signal circuit, by-pass switch, stop-switch and extra receptacles may be added if desired.



Timer for permanent or portable installation



Hydraulic truck mounted drogshovel

Hydraulic Dragshovel

BUCYRUS-ERIE Co., South Milwau-kee, Wis., has announced its Hydro-hoe, a completely hydraulic truck-mounted dragshovel. This unit has special features, according to the manufacturer, which make trenching and other specialized digging faster and easier. These include: two separate digging actions; hydraulic ejector on dipper; no bails, sheave blocks or drag ropes on the bucket; and rapid conversion to clamshell or crane in the field.

Rubber Screen Mounting

DEISTER MACHINE Co., Fort Wayne, Ind., has released a new type of rubber molding for vibrating screens which snaps on to cross members supporting the screen cloth and is said to eliminate one of the major causes of screen cloth breakage. According to the manufacturer, the molding presents a wide flat rubber surface to the cloth to reduce abrasion and to spread the point of contact, to reduce friction and the possibility of later breakage. The new mounting, now standard on all Deister screens, may be applied to vibrating screens now in the field.

Oil Lubricator

THE RUCKER Co., Oakland, Calif., has announced a new size Arnold lubricator, No. 2, with ½-pint oil capacity, for lubricating pneumatic tools. This lubricator, when placed in



Air line lubricator with 1/2-pint capacity

the air line, supplies a flow of oiled air to the working parts of the tool. The No. 2 model is of lightweight alloy, 7 in. long, $3\frac{1}{2}$ in. in width and height, and weighs 32 oz.

Heavy-Duty Boom

SCHIELD BANTAM Co., Waverly, Iowa, has announced a heavy-duty boom, designed especially for lifting and loading with its 5-ton truck-



Lifting and leading boom

mounted Bantam shovel-crane. Available in 25 ft. length, with 5 ft. extensions, this boom is said to have approximately four times more rigidity than standard booms, due to use of heavier reinforcing and bracing to resist shock and sling load conditions.

Noiseless Vibrator

CLEVELAND VIBRATOR Co., Cleveland, Ohio, has developed a new type noiseless air vibrator, known as the Type AC (air cushioned). Basically, the reciprocating action of a hard chrome-plated piston develops the vibrating action. This action is noiseless because the momentum set up by the piston is cushioned by a pocket of air at each end of the vibrator assembly.

Bagged Cement Car Loader

FLEXOVEYOR MANUFACTURING Co., Denver, Colo., has in production a power-driven box car loader, which is operated beneath the bag-filling machine conveyor and delivers bags to the point of loading in the box car, thereby eliminating hand trucking. The conveyor element consists of a series of endless spring belts which operate over grooved steel rollers. It is said that all changes in the position of the car loader can be made while the conveyor is running. It has a capacity of 30 bags per minute and can be engineered to suit conditions.



Power-driven telescoping loader

Shovel-Mounted Tractors

TRACTOMOTIVE CORP., Deerfield, Ill., and Allis-Chalmers Manufacturing Co., Milwaukee, Wis., have made a joint announcement of a complete line of shovel-mounted tractors, with standard bucket capacities up to 4 cu. yd. and available in all four models of A-C crawler tractors. The new, larger sized Tracto-Shovel units, designated as Models HD-9G, HD-15G and HD-20G, are expected to economize and expedite operations on a variety of earth moving and material handling applications. The HD-9G mounts a 2-cu. yd. bucket and dumps at a maximum height of 11 ft. 41/2 in. The HD-15G employs a 3-cu. yd. bucket and has a dumping height of 12 ft. 8 in., while the HD-20G, a torque converter driven tractor, uses a 4-cu. yd. bucket dumping at a height of 13 ft. 5 in.



Tractor shovel unit

Hard Facing Rod

Wall Colmonoy Corp., Detroit, Mich., has announced an oxy-acety-lene hard-facing rod for abrasion resistance, said to have good impact and corrosion resisting properties. The composition of this rod, known as Wallex, is of chromium, molybdenum, manganese, silicon, carbon and iron. Sizes available are: 3/16 in. dia., 8 to 12 in. long; and 5/16 in. dia., 8 to 12 in. long; and 5/16 in. dia., 8 to 12 in. long.

Reduction Mills

C. H. WHEELER MANUFACTURING Co., Philadelphia, Penn., has announced that its fine particle reduction mills, or fluid energy mills, formerly leased on a rental basis, are now available for purchase outright. The mill is based on the principle of fluid energy attrition, has no moving parts, and may be confined to an area 8 x 12 ft. to include grinding and collectors. The mill is, at present, available in two sizes. Model 0405 is the small mill for 200- to 1800-lb. feed rate per hr., and Model 0808 is for 400to 6500-lb. feed rate per hr. The large mill produces 21/2 times more than the small mill, using air, and 3% to 4 times more, using steam. Production per ton is correspondingly cheaper where the large mill can be used.

Modified Jaw Crusher

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., has announced that the latest modification to the basic design of its "A-1" jaw crusher is the dry rolling toggle. Company engineers say that the design results in reduced wear and maintenance and contributes to increased safety. The change from sliding to rolling action is accomplished by reversing the curvatures of the conventional toggle ends and seats. A special rubber apron is provided to keep material out of the toggle seats. The dry rolling toggle also incorporates a safety shear member on the portion between the pitman and the frame.

Side-Dump Semi-Trailers

EASTON CAR & CONSTRUCTION CO., Easton, Penn., has developed semitrailers of gooseneck construction and employing two of its most popular side-dump body designs. First of the new trailers to be completed is Model TL-1015, a lift door side-dump of 15ton capacity, designed for service with the Caterpillar DW-10 diesel tractor. Body and trailer frame are of allwelded steel construction, with heavy box-section reinforcements throughout. The push-button controlled overhead hoist operates a dual hook which engages the two dumping bars on the lift floor. The maximum dumping angle is 70 deg.



Gooseneck trailer of 15 ton capacity

Horizontal Conveyor

THE RAPIDS-STANDARD Co., INC., Grand Rapids, Mich., is manufacturing a horizontal belt conveyor for systematic handling of goods during assembly, order-packing and similar operations. Called the Rapistan Table-Veyor, this power conveyor may be varied from 10 to 60 ft. by adding or removing 5-ft. sections, and is available in a choice of 10-, 12-, 16-, 18- or 20-in. belts.

Troughed Belt Conveyor

THE FAIRFIELD ENGINEERING Co., Marion, Ohio, has introduced a heavy-duty material handling conveyor, the Model 638 power-moved troughed belt conveyor, especially designed for construction field application. The company reports that this machine has a simplified drive and controls, improved maneuverability of individual wheel steering, hydraulically operated boom hoist and self-equalizing castors for balance in yard operations.

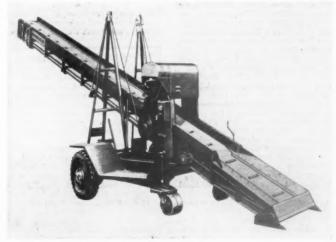
Dust Collector Blow Rings

TURNER AND HAWS ENGINEERING Co., West Roxbury, Mass., has developed a self-adjusting blow ring for its bag-type dust collector. Each filter bag is circled by a ring which travels up and down the bag, flexing it slightly and directing the high pressure reverse-air-jet into the bag from all sides. Each blow ring is made in two half-sections independently mounted on a common carrier assembly. The company states that the sections expand as necessary to conform to the

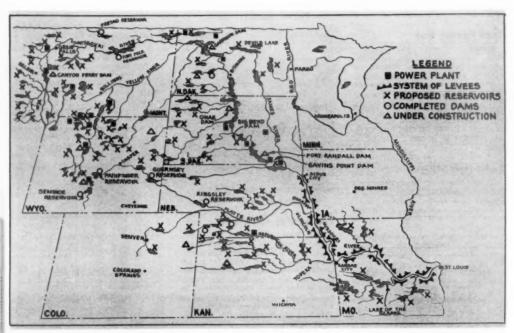


Self-adjusting blow rings on dust collector

bag's diameter as they travel the length of the bag, automatically adjusting to changes in the diameter. In addition, it is said, the entire blow ring assembly is so mounted that it floats laterally to compensate for possible vertical misalignment of the bag.



Power-moved meterial handling conveyor



Pick-Sloan Plan for Missouri River Basin, showing Corps of Engineers and Bureau of Reclamation projects as described in H.D. 475 and S.D. 191,
78th Congress, and approved by Congress in the 1944 Flood Control Act

Aggregates Play Major Part in Missouri River Basin Development

By WALTER B. LENHART

THE BACKBONE OF THE Missouri Sloan plan, is the seven dams for the Missouri river itself. Six of these dams are Corps of Engineers, U. S. Army, projects. Canyon Ferry dam, the seventh, is a Bureau of Reclamation job. Four of the dams sponsored by the Corps of Engineers are the largest of their type. Three of them are now under construction: Ft. Randall. Oahe and Garrison dams. Ft. Peck dam, the largest of them all, was completed in 1937. Ft. Peck is the largest hydraulically-filled earth dam in the world. Garrison is the largest rolled-fill earth dam. Big Bend and Gavins Point dams, now in the planning stages, will play minor roles in the devolopment program. Ender the Pick-Sloan plan about

Ender the Pick-Sloan plan about 4,700,000 acres of new land will be irrigated and supplemental water will be available for 500,000 additional acres. There will be an installed capacity of 1,600,000 kw. with an expected ten billion kw.-hr. produced annually. Much of this power will be used to pump water for irrigation purposes.

The development of the Missouri

River Basin encompasses 105 dams and reservoirs and embraces the states of North and South Dakota, Montana,

With the lower Missouri River Basin just recovering from the disastrous 1951 flood, development of the basin as proposed in the Pick-Sloan plan is again receiving the nation's attention. Rock products producers will play, and are playing, an important part in that develop-

This review of the Missouri river project in general is followed by articles on the various producers supplying material for Ft. Randall dam, one of the major dams now under construction on the Missouri in South Dakota. The November issue of ROCK PRODUCTS will feature reports about the plants supplying Garrison dam in North Dakota.

Wyoming, Nebraska, Kansas and Colorado, and parts of Minnesota and Missouri. The plan also includes a system of levees under construction from Sioux City, Iowa, to St. Louis,

Besides serving as the "bread basket" of the nation, the area is rich in other material resources. Oil fields being opened in the Williston area of North Dakota may prove to be one of the nation's great oil fields. There are lignite coal beds in North Dakota and Wyoming as well as sub-bituminous and bituminous coal resources in the area that can be utilized in the production of synthetic liquid fuels. Coal and oil make up 95 percent of this country's fuel reserves and coal-hydrogenation experimental work has been going on for several years.

Joint Venture

Development of the basin is a joint venture under the leadership of the Corps of Engineers and the Bureau of Reclamation. The division of the work in the Missouri River Basin between the two organizations is contained in Senate Document No. 247, 78th Congress, 2nd Session. Boiled





Left: Angostura dam on Cheyenne river near Hot Springs, S. D. Right: Alcova dam on the North Platte is part of the Bureau of Reclamation Kendrick project in Wyomina

down it means, briefly, that the Corps of Engineers will construct all projects on the main stem and its tributaries where flood control and navigation are the principal benefits. The Bureau of Reclamation will construct all installations on the Missouri and its tributaries where irrigation and development of hydroelectric power are the chief benefits.

Farmers and ranchers in the drainage areas are also contributing to the over-all picture by building small dams to conserve water and check erosion. As one travels through the upper reaches of the Missouri Basin one is struck by the innumerable check-dams constructed in almost every draw, gulch or ravine. In most cases these are 4 to 10 ft. high earth dams built progressively down the ravines. Each dike performs a threefold task: holds the water allowing much of it to be retained in the earth. prevents erosion, and retards the flow of silt into the larger dams and reservoirs on the important water courses. These innumerable small dams can also play an important part in flood control by stopping most of the flood waters at their source.

Flood Control

Studies on general conservation and flood control of the Missouri River Basin started as far back as 1884 when the Missouri River Commission was established. The cumulative effect of the studies has resulted in the present long range program.

The annual run-off of the Missouri River Basin above Sioux City, Iowa, is approximately 24,403,000 acre-ft. The five main stem dams will be able to accommodate about 15,415,000 acre-ft. This does not take into consideration space held for flood control in the reservoir behind Ft. Peck dam, minor flood control reserves at Canyon Ferry, Gavins Point, and Big Bend dams, the other 98 dams and reservoirs that comprise the over-all development plan, nor the small check dams in hundreds of ravines and gullies.

The five main stem dams (Ft. Peck, Garrison, Oahe, Ft. Randall and Gavins Point) above Yankton, S. D., will not control flood waters originating in the lower Missouri River Basin, however, they will have an indirect effect on the frequency of floods for a great distance downstream. The proportion of volume in any given flood which will enter the stream above these controlling reservoirs cannot be determined in advance but these reservoirs will be of some benefit in most floods, while many floods will be completely controlled by them.

The occurrence of floods on the Missouri river is highly seasonal. High waters in the early spring are pro-duced by concurrent melting of snow on the Great Plains and the break-up of the ice on the river. This type of flood will be almost completely eliminated by the upstream reservoirs. The late spring flood is caused by heavy local rains which coincide with the peak of the snowmelt in the high mountain areas. The upstream reservoirs can check run-off from the snowmelt but will not be able to control the high waters from the heavy local rains falling on downstream areas. Smaller reservoirs on downstream tributaries. combined with levees or flood walls on the main stem, are needed to provide complete protection.

A high degree of protection will be afforded to the entire basin when the reservoirs and levee system, which will ultimately extend from Sioux City, Iowa, to the mouth of the Missouri, are completed.

None of the dams planned or under construction will have locks for river navigation so interstate water transportation must from necessity stop at Gavins Point dam a few miles upstream from Yankton, S. D. However, if conditions point to their need, locks can be added easily to any or all dams for the type of construction lends itself to such additional construction. Water transportation of aggregates and other rock products items in the area has been practically nonexistent. For relatively long distance transportation, river barging is one of the cheapest methods devised and this form of transportation will undoubtedly assume a position of importance on the Missouri and Mississippi rivers and their tributaries in the years ahead.

Siltation

The subject of dam siltation is an important one when considering the development of the Missouri Basin. The silt in the Missouri river is an extremely fine material ranging down into the colloidal. It will have no serious effect on power development.

The extent to which the subject of siltation behind dams has been studied by the developers of the Missouri River Basin does not seem to be generally recognized. As a part of these investigations Report 308 (House Document No. 238, 73rd Congress, 2nd Session) was based on an exhaustive study of sediment in the Missouri River Basin between 1929 and 1932. This study furnished a sound basis for the construction of Ft. Peck dam which is expected to silt up 1000 years from the date of its completion in 1937. In 1937 a continuing study



State owned cement plant at Rapid City, S. D., supplies some cement for the basin's development



Spillway gate structure, upstream face, for Ft. Randall dam

of sedimentation provided the necessary data for selection of the five other dams across the Missouri river: Gavins Point, Ft. Randall, Big Bend, Oahe and Garrison. Gavins Point and Big Bend dams are of minor importance at the present time; Ft. Randall, Oahe and Garrison are now under construction. Each of these projects (except Big Bend which is for power only and will not be impaired by complete sedimentation of its pool) was provided with a "dead storage" pool of sufficient size to accommodate the sediment that will enter it from the drainage area downstream from the next upstream dam for hundreds of Engineers estimate that the life of Oahe and Garrison reservoirs will exceed 400 and 500 years.

Earth-Fill Dams

The three dams, Ft. Randall, Oahe and Garrison are for the most part compacted earth-fill dams, yet the cubic yardage of concrete for spillways and power development runs into sizable figures as does the riprap requirements. Ft. Peck dam is likewise earth-filled. It is the largest dam of its type in the world, using 125,627,000 cu. yd. of earth fill. Oahe will be second with 78,000,000 cu. vd. of fill and Garrison third with 70,000,000 cu. yd.; Ft. Randall is a mere 30,000,000 cu. yd. These four dams total 303,627,000 cu. yd. of fill. It is difficult to comprehend these huge figures but if a fleet of trucks hauled 100,000 cu. yd. per day it would take almost ten years to haul that yardage. As Ft. Peck dam was constructed by dredges it is difficult to get a figure on the excavat-ed material handled, but the three dams now under construction will have 202,000,000 cu. yd. of excavated material compared to 178,000,000 cu. yd. of

The three dams will require approximately 4,000,000 cu. yd. of concrete and about 2,000,000 cu. yd. of riprap. Designs show that approximately 125,-

000 cu, yd, of riprap material will be placed in Ft. Randall dam, of which percent is filter, 17 percent in spalls and 53 percent in riprap. Oahe dam will contain about 810,000 cu. yd. of riprap material divided into 20 percent in filter, 20 percent in spalls and 60 percent in riprap. Some concrete pipe is required including that used for highway and railroad relocation work but the amount is not large. However, after the dams are completed and the irrigation program gets under way the footage of concrete pipe will undoubtedly run into large figures.

Similar Construction

In a general sense all of these dams are similar in construction. They might be called a "floating-gravity-compacted-earth-fill," and they include pervious and impervious beds of compacted fill.

The Missouri river bisects a vast plateau, the top of which makes up



Cross section of Ft. Rendell dom. The design for Ft. Rendell does not contemplate the use of sheet pilling as shown in the drawing; it is included to illustrate Garrison and Ft. Peck dam designs which are similar except for the addition of the pilling.

much of the prairie sections. The meandering river cutting this great plateau has eroded a deep gash and the dams are being built across this shallow-looking canyon. The foundation material under the dams varies a little as to detail but essentially they are similar. None rests on what could be classed as a hard rock. Ft. Randall dam could be used as an illustration for it rests on a pervious stratum that will drain the dam itself, giving rise to the term "floating-gravity. Foundations for Ft. Peck and Garrison are somewhat similar except these two dams have sheet piling driven to depths of about 150 ft. into the foundation material. This sheet piling is almost under the apex or crest of the dam and parallels the long axis of the dam. This type of construction is not an experiment and its reliability has been demonstrated at Ft. Peck dam, now 14 years old. Note that in the drawing of a cross section of Ft. Randall dam its base is more than a mile thick. The design does not contemplate sheet piling although the sketch includes it to illustrate Garrison and Ft. Peck techniques.

Aggregates

Acceptable aggregates are difficult to find in the areas close to the construction sites. "Reactivity" and ironmanganese concretions raise major problems if local aggregates are used. Thermal incompatibility does not seem to offer any problem. Since local materials are not used freight charges to haul in acceptable materials from distant sources is considerable: sand, \$3.36 per ton; crushed stone and gravel, \$2.75; riprap, \$2.75; and spalls, \$2.32 per ton.

It would seem that here would be room for a saving by using aggregate beneficiation processes — heavy-media (sink-float), gravimetric separation, froth flotation or combination of processes—so that local aggregate might be made usable.

From Chamberlain, S. D., about in the middle of the state, and extending northward are beds of iron-manganese materials. These black, laminated beds can be seen outcropping along the general course of the Missouri river and no doubt are the source of the iron-manganese concretions that appear in the gravels in the general area. The exterior is black, smooth and on drying often shows cracks indicating an unstable material. If the rock is broken open a yellow core is revealed that ranges from a hard rocky material to soft clays. The iron in these gravels is said to be iron carbonate. One of the main objections is the staining of concrete in which these materials are used. Due to their friable character, these manganese-iron "chocolate bars" are unstable. However, heavy-media separation might be the answer to removing these particles. Available figures show that the process can be applied to gravel or crushed stone for about 13 cents

per ton, based on tonnages in the 4000 tons per 24 hr. range.

In the vicinity of Garrison dam, even in the foundation areas itself, lignite coal comes into the aggregate picture and undoubtedly sand in the areas is impregnated with coal. Either gravimetric methods or froth flotation could be used to remove coal from sand. Froth flotation is now being used in the anthracite coal mining areas on a commercial basis to recover fine coal from materials formerly wasted. Cost of reagents for floating fine coal out of sand might be as high as 50 cents per ton, or as low as 10 cents per ton. Other operating cost factors for flotation of coal would probably not add more than 2 cents per ton to the operating costs.

The majority of local aggregates are not acceptable because of reactivity. One of the sources of reactivity in the Missouri River Basin is said to be mineral chalcedony. This is a form of quartz with the general formula SiO2, n-H2O. It is considered to be a secondary quartz, that is, quartz precipitated from ground water as a vein-filling material. Some class it as cryptocrystalline. It often has a waxy luster and occurs as semi-crystalline linings to vugs, caves or caverns. Sometimes it fluoresces under ultraviolet light and some chalcedony has reacted to the Geiger counter indicating a radioactive material. This mineral and other similar opal-type minerals in the area are considered reactive. It is believed they form a gel with the alkali in portland cement and expansion of this gel eventually destroys the concrete.

At Oahe dam, just a few miles north of Pierre, the capital of South Dakota, work was just starting and concrete was playing no part in the construction work—nothing but a vast fleet of bottom dumpers building the wings of the dam.

The aggregates going into all the dams are of typical Corps of Engineers specifications. Top size for the coarse aggregate is 6 in. The four sizes are 6 to 3 in.; 3 to 1½ in.; 1½ to ¾ in. and ¾ in. to No. 4 mesh. All coarse and fine aggregates are inspected at the production source and acceptance or rejections made there. Freight is paid by others than the producer. At each dam several contractors are involved and each secures and stockpiles his own material and batches it in his own plant. As no



At left are some of the larger iron-manganese concretions, at right are smaller typical "chocolate dreps." The exterior is hard while the interior is soft and clay-like



One of the batching plants at Garrison dam. Note ducts for air cooling of aggregates

great masses of concrete are involved, only spillways, powerhouses, tunnel linings, etc., cooling of concrete by embedded pipe is not practiced. Air cooling of coarse aggregate seemed to be general practice.

At each construction site a townsite had been laid out. Ft. Randall has Picktown with a modern hotel and business section laid out along ultramodern lines. Garrison has the town of Riverdale. No name has been assigned to the housing area to be constructed at Oahe. The dams employ at peak conditions about 10,000 men each.

The power that will be developed by these projects will be turned over to the Bureau of Reclamation for final disposal but the power plants will be operated by the Corps of Engineers. It was said that the first land to be irrigated would be in selected areas east of the Missouri river in the Dakotas.

According to the Missouri Basin Inter-Agency Committee's six year report, "Program for Land and Water Resources Development of the Missouri River Basin." it will cost approximately \$8,519,350,127 to develop all features proposed for the Missouri River Basin. The breakdowns of this total show the costs to be charged as follows: Corps of Engineers, \$2,102,-400,751; Department of Agriculture, \$3,092,328,000; Department of Interior, \$3,314,356,376; State of Nebraska \$3,-199,000; and South Dakota, \$7,066,000.

Dams Completed or Under Construction

Smaller dams on tributaries of the Missouri are gradually being completed. Many of these are being built by the Bureau of Reclamation. Some of the dams listed as recently com-

Dam	River	State
Angostura	Cheyenne	South Dakota
Enders	Frenchman Creek	Nebraska
Medicine Creek	Medicine Creek	Nebraska
Heart Butte	Heart	North Dakota
Cambridge Diversion	Republican	Nebraska
Alcova	North Platte	Wyoming

Dams under construction include

Dams un	der construction	on meru
such as:		
Dam	River	State
Kortes	North Platte	Wyomin
Boysen	Big Horn	Wyomin
Bonny	South Fork, Republican	Colorado
Dickinson	Heart	North Dakota
Shade Hill	Grand	South
Cedar Bluff	Smoky Hill	Kansas
Superior- Courtland- Diversion	Republican	Nebrask
Canyon Ferry	Missouri	Montana
Trenton	Republican	Nebraski
Keyhole	Belle Fourche	Wyomin

Lignite as Fuel

THE U. S. BUREAU OF MINES laboratory, Grand Forks, N. D., has been conducting research on lignite as fuel. Vast reserves of lignite underlie most of North Dakota and much of Montana, but due to its low burning qualities, the use of lignite as a fuel has been negligible. Another disadvantage of lignite is its high water content, approximately 35 percent of its weight. A "flash drying" system has been developed in which the fuel is subjected to intense heat over a short period. This reduces the moisture content to 5 percent, thus increasing the heating capacity. The Bureau of Mines researchers believe that the flash drying system has possibilities for preparing lignite as a fuel for use in cement and brick man-



Powerhouse foundation for Ft. Randall is being constructed by McCarthy Improvement Co.

Three sizes of coarse aggregate, natural sand selected from remote sources to meet specifications

REQUIREMENTS FOR FT. RANDALL DAM

F.T. RANDALL DAM is the farthermost downstream and the smallest of the three major dams now under construction by the Corps of Engineers across the Missouri river in South and North Dakota. The coarse aggregates are shipped from Alexandria and Dell Rapids, S. D., and the fine aggregates from Hawarden, Iowa. There is some sand and gravel in the immediate vicinity but exhaustive tests and service records indicate it is reactive, contains iron-manganese, and some materials that stain the concrete, and some materials that tend to pop in the walls.

The coarse aggregate from Alexandria and Dell Rapids is a hard, fine grade, reddish-tinged quartzite that tends to break into flat and elongated slivers. At the quarries, hammermills are used to break up these slivers. No grids are used in the hammermills and they, for the most part, are not intended to do any reduction, their main job being to break up the flats in a previously sized product. Wear on the hammers is severe and in one case they were reversed every four hours. After eight hours of service they were built up with a hard-surfacing welding rod.

Several contracting firms are doing

the construction work at Ft. Randall and those who have work related to concrete have their own railroad trackage, unloading facilities and batching plants. For awhile there were three concrete batching plants but at the time of inspection only two remained in operation.

Type II portland cement is the main cement used. Protex air-entraining agents are used, but no natural cements or pozzolan additives.

The main source of supply for portland cement is the Louisville, Neb., plant of Ash Grove Lime & Portland Cement Co. The Des Moines, Iowa, plant of Penn-Dixie Cement Corp., the Oglesby, Ill., plant of Lehigh Portland Cement Co., the Davenport, Iowa, plant of Dewey Portland Cement Co., the South Dakota State Cement Plant, Rapid City, S. D., and Ideal Cement Co., Denver, Colo., are also suppliers for this project.

Ft. Randall dam is a rolled earth fill structure involving about 26,000,000 cu. yd. of fill and 50,000,000 cu. yd. of excavation. The creat length of the dam is 10,500 ft. Its height is 160 ft. above the flood plain. About 1,-200,000 cu. yd. of concrete are involved and 60,000 cu. yd. of riprap.

Riprap material is obtained from overburden excavation and consists of quartzite boulders of glacial origin.

The earth fill material is hauled by a fleet of fifty-two 15-cu. yd. Euclid bottom- and end-dump trucks loaded by 6- to 7-cu. yd. Marion electric shovels. Twelve 20-cu. yd. Mack trucks were also in service. The Western Construction Corp. has the present contract for earthwork stage III for excavation and embankment which is about 85 percent complete. The closure of the river will be completed in July, 1952. A recent addition to the fleet of trucks used in fill construction on the right bank of the Missouri are some of the latest Euclid end-dump trucks. These haul a heaped load of 38 cu. yd. and are powered by two 300hp. Cummins diesels. They operate from 8.8 to 38.2 m.p.h. The body is 221/2 ft. long, 111/2 ft. wide and 46 in. deep. They have ten 18.00 x 33, 24-ply tires.

The intake structure consists of 12 reinforced concrete towers each containing two control gates. Twelve concrete lined tunnels have been driven through the east abutment and through the Niobrara chalk that makes up most of the wing and foundations.



The panaramic view of Ft. Randall dam takes in more than 2 miles of construction activity: the crest of the dam itself is 10,500 ft. long. The Missouri river is at the far laft. Earth fill construction is still in progress on the laft bank. One batching plant can be seen at left center, the other on the right. Powerhouse foundation and outlet structure construction can be seen in the center. The two draglines are just behind the crest of the 160 ft. high earth fill which extends from behind the laft batch plant to the other on the right; the gap on the right will be closed later

dation areas. These tunnels are about 900 ft. long and have a finished diameter of 22 and 28 ft. Eight will be used for power generation and four for flood control. A channel is being dredged to get the waters of the Missouri to the intake structure. The 30-in. diameter dredge pump excavates nominally about 50,000 cu. yd. of material per day.

The gross pool storage area of the reservoir above the dam will total 6,300,000 acre-ft. No important towns will be innundated by the backed-up waters but at Chamberlain, S. D., some railroad, highway and bridge relocation work is necessary. The land innundated is typical upper Missouri river bottom land. The surface area of the lake formed is 118,400 acres.

Artificial Drainage

A small amount of artificial drainage in the form of concrete pipe is used in the dam itself; however, the pervious foundation (sand and Niobrara chalk) is expected to take care of most of the drainage in the dike areas. About 4000 to 5000 ft. of reinforced concrete pipe ranging in diameter from 18 to 48 in. is involved in the work at Chamberlain, S. D., and this is coming from Canton Block and Tile Co., Canton, S. D. The pipe is made on an improved Quinn tamper that is being developed cooperatively by Ernest Rowe, owner of Canton Block and Tile Co., and Quinn Wire & Iron Works, Boone, Iowa.

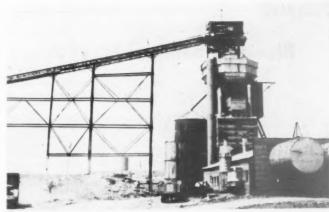
Concrete

The total cost of the Ft. Randall project as of 1951 estimates is placed at \$180,000,000; it is expected that the dam will be substantially complete and the first power generated in 1953. The spillway weir is the largest mass of concrete, involving about 200,000 cu. yd. of concrete. The maximum size of aggregate in this mass is 6 in.

A water-cement ratio of about 1:2 is used for all concrete except the interior mass concrete in the spillway. giving concrete strengths of about 4000 p.s.i. at 28 days. Where 3-in. rock is the maximum size, a 4-bag mix is used. For the 1½-in. top sized rock, a 5-bag mix is used and some 6-bag concrete is used in the tunnel crown. Air at 5 percent (3 to 6 percent range) is the constructors' aim. Maximum placing temperature of the concrete is 65 deg. F. (60 deg. F. for the spillway weir). Ore of the batching plants has facilities for cooling the coarse aggregates by forced cold air augmented by flake ice. Placement of the concrete is by industrial haulage, cranes and Blaw-Knox huckets

The face of the powerhouse will be 4- x 8-ft. precast panels with a rose quartz surface. Sample panels on hand at the time of inspection had been supplied by Midwest Concrete Industries, Des Moines, Iowa.

Johnson-Winston Co. has the intake and spillway gate structure. Mc-Carthy Improvement Co. has the still-



McCarthy Improvement Ca. batching plant uses a forced air cooling system for the coarser aggreactes, supplemented by a flake ice unit



General view of the Johnson-Winston Co. batching plant. Aggregate is reclaimed 100 percent in the bins at the right as they are hopper bottomed and feed to a reclaiming belt

ing basin and powerhouse foundation; Donovan, Lovering & Boyle has the powerhouse. Westinghouse Electric Corp. has the contract for electric generators and their installation. Allis-Chalmers is supplying a considerable amount of miscellaneous electrical equipment and Woodward Governor Co. will supply the governors for controlling the speed of the electrical generating equipment.

Batching Plants

Johnson-Winston Co. has a C. S. Johnson & Co. batch plant using two 2-cu. yd. Koehring mixers. A Barber-Greene conveyor system is used for

stockpiling the aggregates. The upper structure of the storage area is wood cribbing but the lower portion is hoppered and of concrete. By its use a 100 percent recovery of the stockpiled aggregate is possible. The car unloading equipment includes a Robins car shakeout that is suspended from a simple steel A-frame and the shakeout is raised and lowered by a small winch. The batching plant is rated at 85 cu. yd. per hour. Ice is used in the mixer and it is manufactured by a Vogt tube ice machine. The unit can make 60 tons of ice per day. Cement storage capacity is 7000 bbl. This

(Continued on page 146)



Spillway section with two of the tunnel portals in the background; concrete segments in foreground are part of the stilling besin. The concrete lined tunnels are about 900 ft. long and are part of the fload control and power generating section of the dom. The tunnels were driven through Niobrare chalk, which makes up a considerable portion of the wing and foundation areas

Blending Sand to Meet Army Specifications

Fines from rod mills make up deficiencies at Hallett Construction Co. Hawarden, Iowa, plant

S AND FOR FT. RANDALL dam is all coming from deposits near Hawarden, Iowa, about 30 miles north of Sioux City, Iowa. The deposits are on the banks of the Big Sioux river, the boundary line between Iowa and South Dakota. One of the main suppliers of sand is Hallett Construction Co. of Crosby, Minn. At Hawarden, Hallett Construction Co. built a plant on ground owned and operated by Hawarden Gravel Co. Through a cooperative arrangement, the Hallett orsand and Hawarden Gravel Co. markets locally the coarser aggregates that might be considered a by-product of the sand operations. C. J. Burington is president of Hawarden Gravel

Continuously Operated Plant

To meet any unusual sand specification there are two schools of thought. One builds its operation around auto-

matic and semi-automatic equipment that is so designed and laid out that many different sizes of sand are produced, and after being produced are blended to meet the specifications. There is no question that this type of plant is easier to operate but it can run into investments of considerable magnitude which might not be justified. The second type of plant is a continuously operated affair and by a series of simple control gates a final product emerges that meets the specifications. Intelligent crews are needed to operate such plants and constant watchfulness is a must. The experience gained is a cumulative commodity. The first few days or weeks of operation, such a plant has a flock of "bugs" but gradually a system emerges that meets the requirements. Once the crew is familiar with the plant, it can meet almost any specification and, because of the plant's low cost and simplicity, can make a profit for its owners. The sand recovery unit of Hallett Construction Co. at Hawarden is such a plant. Much of the success of the operation can be attributed to the energy and resourcefulness of its superintendent, John Aho.

The plant is of wood construction and very compact. The sand from it meets Corps of Engineers specifications and no rejections of its output have been experienced so far. The sand ranks high with any in the United States. The Corps of Engineers keeps a competent testing engineer at the plant and acceptance or rejections are made at the point of shipment and in the pile. Freight is not paid by the producer.

The sand specifications for Ft. Randall dam are as follows:

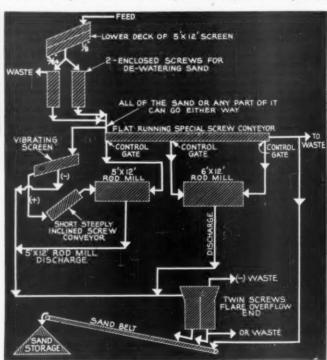
Plus 4 mesh	0-5 percent
Plus 8 mesh	5-15 percent
Plus 16 mesh	10-20 percent
Plus 30 mesh	20-30 percent
Plus 50 mesh	20-30 percent
Plus 100 mesh	12-22 percent
Plus 200 mesh	3-7 percent
Pan	1-5 percent
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Sand Recovery System

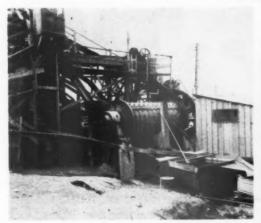
The sand recovery system is built around a specially constructed horizontal or flat running screw conveyor. It is 18 in. in diameter and the sides have been reinforced by two parallel 6-in. channel irons that have been welded to each of the top edges of the screw's housing. This design enabled the operators to cut outlet holes in its bottom or sides where outlets are required to feed the rod mills. The conveyor is about 20 ft. long and mounted



A three-deck vibrating screen over the 25cu. yd. hopper does final sixing of the coarse aggregate



Flow diagram of Hallett Construction Co. send plant





Left: General view of trunnion discharge rod mill that was reworked into peripheral discharge unit. Flat running screw conveyor that is key to plant's operation is at too. The rad mill discharges to twin dewatering screws (bottom right). Right: Throughs from the screen cheed of the send operation (top) split to two dewaterers just below the screen. Sand from the dewaterers can go to a vibrating screen (right) or to the special screw conveyor (far right). Oversize from the screen falls to a short steeply inclined screw conveyor and the material fed to a rod mill (center). The throughs from the screen go to dewatering screws and then on to the main sand belt (left) to the stockpile

about midway in the structure so it can be fed by gravity from units above it, and it can discharge by gravity to other units below it. A control gate at each of the outlet holes can divert all, or part, of the material in the conveyor as needed. Efficient operation depends upon the constant watchfulness of these and other control gates. This flat running conveyor and all other screw-type dewaterers in the plant were supplied by Eagle Iron Works, Des Moines, Iowa.

Peripheral Discharge Rod Mills

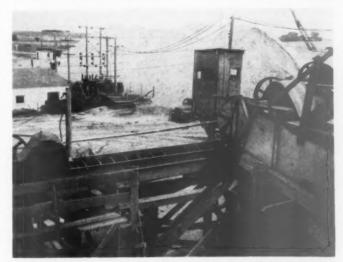
The second noteworthy feature of the plant is the use of two rod mills, the intent of which is to add more minus 100, 200 and "pan" to the fin-ished products. The natural sand is deficient in the finer sizes and two rod mills were necessary to make up the deficiency. One is a 5- x 12-ft. Colorado Iron Works unit and the other is a 6- x 12-ft. Allis-Chalmers machine. Both were originally standard types of mills, that is, trunnion fed at one end and discharged through the trunnion at the other end. Both were altered by the Hallett operators to peripheral discharge mills by cutting a series of holes in the shell and liners. These holes form a band around the center of the mill about midway between the end castings. Chutes to feed into both ends of the mills were then improvised. The size and number of holes were a matter of trial and error but there are now four holes to each barrel and the holes are roughly 2 x 3 in. without any screen or grids, but equipped with gates to regulate material flow.

Processing Operation

The screen ahead of the sand operation is a 5- x 12-ft., three-deck, wet, Simplicity screen. The lower deck has a top of ½-in. wire and a bottom section of 3/64-in. wire. As will be seen from the flow diagram, the throughs from this screen split to two Eagle screw-type dewaterers. These screws are 36 in. in diameter and 25 ft. long. The sand from them can go to a 4-x 8-ft. Tyler Hum-mer screen, or to the previously mentioned flat running screw conveyor, or to both, or to the stockpile belt. That portion going to the Hum-mer flows over the deck of the vibrator which has 1-in. x 30-mesh wire on it. The oversize

from the Hum-mer falls to a short steeply inclined screw conveyor and the material fed to one end of the smaller rod mill. The throughs from the Tyler unit flow to a pair of 24-in. x 25-ft. Eagle dewatering screws. The sand from these two screws goes to the sand belt and thence to the stockpile. At the outset of operations a short bucket elevator was used in place of the steeply inclined screw conveyor but it proved troublesome. The feed to the opposite end of the smaller rod mill is from a slot in the bottom of the

(Continued on page 146)



The heart of the plant is a special flat running screw conveyor (center). The heavy channel iron worlded to the sides strengthens the housing so that outlish holes can be cut in the bottom or sides wherever needed. Primary develorer is on the right.



General view of the oll-steel plant of L. G. Everist, Inc. that will supply some of the fine aggregate for Ft. Randall dam. Structure at left houses a scalper and a 10-in, gyretory crusher. Structure at right includes rake dewaterers above the rod mills and screening and washing units above the car loading bins



Throughs from the gyratory crusher are returned to the scalper via this well-designed transfer station

Commercial Plant Produces Sand for Army

G. EVERIST, INC., Sioux Falls, S. D., has contracts with Johnson-Winston Co. for aggregates for the first stages of spillway construction at Ft. Randall dam. This involves about 70,000 tons of fine aggregate that will come from its Hawarden, Iowa, plant and 270,000 tons of crushed rock from its Dell Rapids, S. D., operations.

At Hawarden, the sand will be taken from bench deposits on the east bank of the Big Sioux river that flows almost due south at that point and empties into the Missouri river at Sioux City, Iowa, 30 miles south of Hawarden. The deposits yield considerable gravel that will be sold locally. Some of the digging in the pit is below water. A 54-B, 2½-cu. yd. Bucyrus-Erie dragline does the primary digging and two Euclids haul to the plant. The %-mi. haul is over a flat

The deposit, similar to others in the Hawarden area, is deficient in fines (minus 100- and minus 200-mesh) and for some time the plant has used a 6- x 10-ft. standard Marcy mill to make up this deficiency. At the time of inspection a second 8- x 12-ft. standard Marcy rod mill was being installed. On the standard type of rod mill used the feed is through both trunnions and has a center peripheral discharge.

The plant is a neat assembly and is of steel construction throughout. It is served by the Chicago, Milwaukee & St. Paul & Pacific and the Chicago and North Western railroads.

Only one crusher is required as the gravel is of nominal size. The crusher is a 10-in. Allis-Chalmers gyratory and it receives its feed from a Tyler F-600, two-deck scalper screen. The crusher and scalper are housed in a

separate structure and a belt conveyor returns the crushed gravel to the first belt conveyor serving the scalper.

The final screening plant uses three, 4- x 12-ft., double-deck, wet Cedarapids vibrating screens in conjunction with Eagle Iron Works log washer and de-shalers for the coarse aggregate. These are mounted over a single row of steel parabolic bins for car loading. For recovery of the sand and dewatering there are five duplex rake dewaterers that are mounted with the discharge ends of three rakes facing the discharge end of the other two. Part of the sand from the three rakes will fall to a common offbearing belt conveyor to feed the mills. The rakes are mounted on an elevated steel platform almost over the two rod mills. The exact details as to how the sand plant will function will be worked out when operations start but the installation is such that a high degree of flexibility will be possible to meet the Corps of Engineers specifications. It is expected that around 75 t.p.h. will be fed to the rod mills and the ground material returned via a 5-in. Wilfley pump to the remaining two rakes for classifica-

The plant is all electric and power is purchased. Water for the plant is secured from a 10 x 12 Dayton-Dowd centrifugal pump.

R. C. Alfred is production manager and George Wood is plant superintendent. The head offices of the aggregate section of L. G. Everist, Inc., are in Sioux Falls, S. D. J. P. Everist is head of the section.





Left: Two-deck screen, log washers and de-shalers are mounted above the steel parabolic cor loading bins. Right: Five rake dewaterers are mounted just above the two rod mills

Crushed Stone





Left: The plant as seen from the quarry floor. The concrete wall at left center merks the location of the primary crusher. On the rim of the quarry at extreme left is the secondary crushing plant. At extreme right is part of the screening plant, which includes hommermills and final reduction crushers. Structure in the center is the final screening plant, Right: Transfer station and scalper built on the quarry floor connects the primary crusher in the quarry with the secondary crusher station on the rim of the quarry.

Crushing Quartzite for Ft. Randall Dam

Flat and elongated particles eliminated through hammermill operated without grids at L. G. Everist Inc. plant, Dell Rapids, S. D.

THE DELL RAPIDS, S. D., quarry and crushing plant of L. G. Everist, Inc., is one of the most extensive in the upper Missouri River Basin. Dell Rapids is about 20 miles north of Sioux Falls, S. D., and approximately 270,000 tons of crushed rock will be shipped from this plant to Ft. Randall dam to be used for the first stages of the spillway. The Johnson-Winston Co. is the contractor for the spillway.

Extensive areas of eastern South Dakota are covered with a hard, pink to light reddish tinged quartzite that is blanketed with variable amounts of top soil. Fortunately those deposits that are of economic importance have modest amounts of stripping to handle. For highway and general construction purposes the material finds wide acceptance and the rock is rated as one of the most satisfactory aggregates in the United States.

To process this rock satisfactorily a relatively large amount of crushing equipment is necessary. It has the disadvantage of tending to break into flat and elongated particles and the general practice is to size the rock and then pass it through a hammermill that operates without grids. The hammermills are not expected to do much crushing but are used to break the flats into two or more pieces. Hammer wear is high but the scheme seems to do the job for the material is acceptable to the Corps of Engineers, builders of Ft. Randall dam.

Rebuilt Plant

The Dell Rapids plant of L. G. Everist, Inc., has been completely re-

built and is essentially a new plant. The assembly of structures, all of steel construction, makes it one of the most imposing crushed stone plants in the country. Belt conveyors from 48 in. to 24 in. do the intraplant transportation. At the time of inspection the plant was in the late construction stages. All the stone will be washed.

The primary crusher is a 36- x 48-in. Traylor and is mounted on the quarry floor. Four 15-ton, end-dump Euclids serve the primary crusher and these are loaded by a 38-B, 1½-cu. yd., Bucyrus-Erie shovel and a 605 Koehring shovel with the same

size bucket. A 42-T Bucyrus-Erie 9-in. diameter well drill is used for primary drilling of the hard quartzite. The bits are 4344 Ni-steel bits. A surge pile was being installed on the quarry floor alongside the primary crusher. It will be built up from the throughs of the riprap scalping plant by a belt conveyor and reclaiming will be via a belt conveyor operating in a tunnel made of large diameter concrete pipe.

Riprap Plant

The riprap plant has a single deck 5- x 12-ft. F-900 Tyler Ty-rock screen. Throughs go to the surge pile (see above). Oversize goes to a large bin



The primary crusher is mounted on the quarry floor (foreground). Structure on the rim of the quarry in the background is part of the final screening and crushing plant and is discharged via an apron feeder into trucks. Trucks in turn dump the riprap directly into railroad cars via a ramp built along side the larger riprap grizzly set up described later. Top size of this riprap can be controlled by the jaw setting of the primary crusher. An excellent controlled size of riprap is manufactured at this plant.

Stone Plant

The secondary crusher is a 16-in. Traylor gyratory. The scalper is a Tyler F-900 and is mounted in a transfer station built topside. Larger sizes of stone from it can be shipped as filter stone, 6- to 3-in, rock, smaller sizes of riprap and other uses. For the third reduction, a 10-in. Traylor and a 6-in. Allis-Chalmers gyratory are available. For final reduction, and for elimination of flats and elongated particles, a 322-R reduction crusher and two Cedarapids 4033 hammermills are used. Screens are two Tyler 5- x 12-ft., F-600's and one 4- x 12-ft. Cedarapids unit. Medium size aggregate (3-11/2 in.) is removed at this point, via a 100-cu. yd. bin to trucks or railroad cars.

Material of 2-in. to minus 1½-in. sizes goes to the final screening plant, which consists of three screens, a 5-x 12-ft. F-600 Tyler and two 4-x 12-ft. Cedarapids units, plus an Akins screw-type classifier. Various sizes of aggregate are produced here. The most common sizes being produced are 1½-¾, ¾-No. 4, ¼-¼, ¼-Valued are 1½-¾, ¼-No. 4, ¼-¼-Valued are 1½-¼-¼, ¼-No. 4, ¼-¼-Valued are 1½-¼-Xalued are 1½-Xalued are 1½-





Riprop and jetty stone play an important part in the operation. Top: Fines from the riprop grissly fall into a bin below and are trucked back to the crushed stone plant for processing. Bottom: Buffers suspended over the grissly slaw down the flow of rock into the cars

¹/₄-1/16 and 1/16 down. Sizes can, of course, be changed to meet almost any specifications.

Water for washing is furnished by two Fairbanks-Morse turbine pumps, each having a 500 g.p.m. capacity. These two pumps serve a dual role. They also dewater the quarry, and it is necessary to operate one pump on a 24-hr. shift, spilling the water into the Big Sioux river, when water is not required for washing the aggregate.

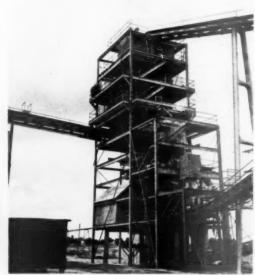
The plant is served by the Milwaukee railroad. Ground-stored material is reclaimed by a 22-B Bucyrus-Erie clamshell rig and a 1½-cu. yd. HM Hough Payloader.

The quartzite from L. G. Everist, Inc., Dell Rapids quarry breaks in blocks or rectangular pieces. This characteristic, along with its extreme hardness and durability, makes the material ideal for riprap and jetty stone and shipments of this material play an important part in the operation. For riprap a separate structure has been provided. It consists of a fan-shaped grizzly made of heavy steel bars assembled in three short sections in line so that when trucks dump to the grizzly the rock tends to cascade down over the bars. They are spaced about 6 in. apart and the throughs drop to a bin from which they can be trucked back and sent through the crushed stone plant. The oversize is chuted to gondolas. Two sets of buffers made of old pads from tractors are suspended over the grizzly and these slow down the flow of rock and lessen the impact when the rock hits the gondola.

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Final screening plan



This high steel structure houses some of the final and intermediate screens as well as some of the final reduction units



Over-all view of Tobin Quarries, Inc., plant. From right to left: dump truck unloading at the 30-in. gyratory primary crusher, two cone crushers in closed circuit with the low-slung vibrating screen just to the left of the cenes. In the center of the picture, a vibrating screen makes a product suitable to go direct to final screening plant and bolance of the material goes through the first hammermill for elimination of flots. Material from that hemmermill goes to vibrating screen (left center) where another separation is made, part going to the final screens and the remainder to the second hemmermill below the screen for another flat elimination. Part of the final screening essembly is at for left

Portable Units Assembled for Large Tonnage

Tobin Quarries Inc., Alexandria, S. D., produces 350 t.p.h. of quartzite in three sizes

THE MAJOR PORTION of coarse aggregates for Ft. Randall dam, up to mid-summer of 1951, came from Tobin Quarries, Inc., Alexandria, S. D. Alexandria is about 14 miles east of Mitchell and 150 miles north of Ft. Randall dam. Shipments are over the rails of the Chicago, Milwaukee and St. Paul railroad. The Alexandria quarry besides shipping to Ft. Randall dam supplies state and local highway and general contractors with stone for all construction purposes.

Three Sixes of Aggregates

Aggregates supplied to Ft. Randall, in contrast with most Corps of Engineers, U. S. Army, specifications, are in three sizes only: 3 in. to 1½ in., 1½ in. to 3½ in. and ¾ in. to 4 mesh. No 6 in. to 3 in. size had been shipped up to the time of inspection. This is due mainly to the fact that no large masses of concrete have been placed

at Ft. Randall up to this writing. All the stone shipped is washed. The Corps of Engineers has a testing laboratory at the quarry and material is accepted or rejected at point of shipment. However, segregation and breakage are watched for at the unloading point.

The rock quarried at Alexandria is a hard, pinkish colored quartzite and similar to that found in the Sioux Falls, S. D., area. This great bed of quartzite covers a large section of eastern South Dakota. Some quartz and quartzite have been obtained that showed small seams of pyrite in it. The country is essentially flat and strippings generally range from 1 to 3 ft.

Portable Units Make Up Plant Assembly

Tobin Quarries, Inc., at Alexandria, is essentially an assembly of

portable and semi-portable units but it is one of the most extensive of its kind we have encountered. This stems from several factors: first, the plant has a capacity of 350 t.p.h. at the primary crusher; second, the rock is extremely hard and tough; and third, elimination of flat and elongated particles makes added screening and processing necessary. The plant is driven by a series of International, Murphy and Caterpillar diesel engines. All conveyors and screens are electrically powered.

The primary crusher is a 30-in. Traylor gyratory ahead of which is a truck hopper and apron feeder. The secondary crushers are a 4½-ft. and a 5½-ft. Symons cone. One of the cone crushers is driven by a Murphy diesel and the other by a Caterpillar unit. Both are V-belted to their respective crusher. The 4½-ft. cone operates in a closed circuit with a visit of the cone of the c





Three sizes of eggregate, 3 - 1½ in., 1½ - ¾ in., - No. 4, are leaded from this assembly. Left: Leading assembly at left, wash water disposal area at right. Sand is recovered from the sump and sold locally. Right: The two larger sizes of rock are loaded from the screen and bins in foreground. The finer size is loaded from the lart right



Sorting for flats on the belt that goes to final screening plant. Hammermill is fed from belt at left. Second hammermill is in background



Note the screen setup over the second hammermill. The two belts at left go to fined screening plant, one carrying the material passing the screen, the other carrying material from the hammermill. The hammermill receives oversize from the screen above it

brating screen mounted over a shallow bin. The 5½-ft. cone receives feed direct from the primary crusher. Belt conveyors are used throughout for transporting interplant materials. All screens, conveyors and hammermills were supplied by Iowa Manufacturing Co.

All crushed rock that passes the closed system at the cones goes to a vibrating screen that is part of the first hammermill assembly. The undersize from this screen goes to the hammermill for breaking the flat and elongated particles. Similarly the second hammermill is preceded by another vibrating screen but here the oversize stone goes to the hammers. Both hammermills are 40 x 33 in. The

screens are 48-in. x 12-ft. doubledeck screens, driven by 15-hp. electric motors.

The first hammermill is driven by an International diesel through Vbelts. The second hammermill is connected directly to a Murphy diesel.

It is not the intent of the operators to use the hammermills for additional reduction. The mills simply give the flats a slap to break them into two or more pieces and thus make the material acceptable to Corps of Engineers specifications. On one of the offbearing belts from the first screen-hammermill assembly handling the 3-in. rock, hand-picking is practiced to a modest degree.

Wear on hammers is high because

of the rock's hardness and abrasiveness. The mills operate 4 hours when the hammers are reversed. After 8 hours the hammers are removed and built up with a hard-surfacing alloy.

Wash water is added to three screens: on the 3-in. material and before the second hammermill, and at the final screens. Crushed stone sand from the washing operations is sold locally.

Three railroad spurs run through the plant for carloading. The loading bins are so spotted that cars load from side chutes and trucks can load from below. Cars are spotted with a tractor.

In the quarry a 605 Koehring and a No. 25 Northwest shovel load to a fleet of six Koehring Dumptors. A 3800-lb. drop ball on a 304 Koehring crane does most of the secondary breaking.

Personnel

The head office of Tobin Quarries, Inc., is in Kansas City, Mo. W. P. Tobin is president and M. L. Griffin and C. W. Roweth are first and second vice-presidents, respectively. W. A. Divelbliss is project superintendent at Alexandria and W. M. Hubbard, office manager.

National Gypsum Paper Mill

NATIONAL GYPSUM Co., Buffalo, N. Y., recently amnounced that the structure of its new paper mill at Pryor, Okla., is nearly completed. Steel erection on the plant began June 1, and construction of the 125,000 sq. ft. structure has progressed ahead of schedule in spite of bad weather and equipment and material shortages.

National Gypsum has three other paper mills, all of which serve the company's eastern plants. The new mill will supply the company's board plants at Fort Dodge, Iowa; Rotan, Texas; and Medicine Lodge, Kan. The Pryor mill, designed by National's engineering staff, will produce a special paper liner used in the manufacture of fireproof gypsum board products, including gypsum lath, wallboard and exterior sheathing. Raw material for the plant will be ground wood, sulphite and several grades of waste papers.

As part of the company's effort to

As part of the company's effort to reduce stream pollution, a "Save-All" unit will be installed to clean waste water leaving the plant. Paper fiber thus recovered will be pumped back into the processing operation.

Opens Limestone Quarry

New Castle Lime and Stone Co., New Castle, Penn., has opened a new quarry near Hillsville, Penn., and is establishing a limestone operation. The machinery and equipment of its Dunbar plant were moved to the new quarry and the Dunbar operation abandoned.

Sand and Gravel

Concrete Materials Co. also produces refractory gannister and readymixed concrete at Sioux Falls, S. D.



The primary jaw crusher is on the quarry floor, secondary and final crushing on quarry rim, final screening plant in background. Excess sized stone can be stored in the quarry if desired

Producing Riprap, Filter Stone and Jetty Rock

CONCRETE MATERIALS Co., Sioux Falls, S. D., is one of the important crushed rock and sand producers in the area, and quite recently its plant near the western edge of the city was revamped so as to better serve the growing needs of the community.

Rock processed at the Concrete Materials Co. plant is the pink-tinged quartzite that is typical of much of eastern South Dakota—a hard, tough, durable aggregate. The company's gannister is used by steel mills and refractory brick companies. The refractory material, sold under the

trade name Firegan, is used for electric furnace and converter bottoms, cupola patching, ladle linings, etc.

The rock in the quarry tends to break in blocky rectangular pieces and is ideal for riprap, filter stone and jetty rock. To drill it, the company uses a 9-in. diameter, No. 219, Rucyrus-Erie churn drill mounted on crawler treads. It drills from 1 to 4 ft. per hour with 28 to 30 ft. per 9-hour day being a good day's work. Steel bits are used and these are sharpened at the quarry using an oil-fired furnace and a Bucyrus-Erie drill sharpener.

The quarry as opened up has a face about 40 ft. high and quartzite in the quarry floor extends about 600 ft. deeper. Illinois Powder Co. cap delays are used for blasting and a 3800-lb. spherical drop ball is available for secondary breakage.

Quarry and Plant Operations

The primary crusher is a 42- x 50-in. Nordberg jaw. It has been installed on the quarry floor with the crushing and screening plant on the rim of the quarry. Belt conveyors are used throughout for intraplant transportation. At the setting currently



Looking from the quarry floor, left to right: ready-mixed concrete plant, primary crusher on quarry floor (center), secondary and final crushing plant at rim of quarry, and final screening plant at far right



The secondary crusher at the bottom is hendling fines from the grizzly following the scalper. The large rocks, 6 to 7 in., go to cars for riprop via a beam conveyor



Final reduction is handled by 4-ft. and 41/2-ft. cones

used on the primary jaw crusher, a set of plates for the jaws will last about 40,000 tons. The plant has a capacity of 150 t.p.h. and all rock is washed. Water for washing is first introduced under the scalper screen. For haulage in the quarry the company uses three Autocar diesels and these are loaded by a 2½-cu. yd., 54-B, Bucyrus-Erie shovel. The Autocars haul a 10-ton payload.

The secondary crusher is a 14-in. Allis-Chalmers gyratory, located on the quarry rim. The scalper is an Allis-Chalmers unit and stone from its top deck can pass over a stationary grizzly after which the rock can fall to a boom-conveyor and be loaded into open-top cars for riprap and other uses. For final reduction 4-ft. and 4-ft. Symons cone crushers are available. The undersize from the scalper can flow to a 4-x 16-ft. Nordberg screen mounted immediately ber



The quartiite like most of that in eastern South Daketa tends to break in rectangular pieces

low the scalper and the set-up is such that rock can go to the 14-in. gyratory or to the cones. If the latter, a short, flat-running belt conveyor is used.

The crushed rock from the secondary and final crushing plant is then belt conveyed to the final screening plant which is a separate structure. This structure comprises eight concrete bins each holding 150 tons. Two 4- x 16-ft. Nordberg (Symons) screens do the final sizing. Crushed quartzite sand from the washing plant is recovered from a sump by a P&H crane.

Ready-Mix Operations

Concrete Materials Co. is one of the larger and more progressive ready-mixed concrete producers serving the Sioux Falls area. The plant is near one of the important highways and adjacent to the quarry and crushed stone plant. It is rated at 200 cu. yd. per day. It has a C. S. Johnson weigh batcher and five Challenge truck mixers with several more mixers of the same type on order. Bulk cement is used in the plant and the fine aggregates come from companyowned sand operations. The company, at the time of inspection, was building a new sand plant about six miles east of Sioux Falls.

R. S. Sweetman is president of the company. C. T. Crampton is general superintendent, Elmer Miller, quarry and crushed stone plant superintendent, and Curtis Gilbert is in charge of the ready-mixed concrete operations.

Ceiling Price Regulation Re-Written

OFFICE OF PRICE STABILIZATION has rewritten "General Ceiling Price Regulation 22," in order to incorporate the changes that have been made since it was first issued January 26, 1951. The basic provision is Section 3, which tells how to figure the ceiling price.

There are qualifications to this overriding procedure for the determination of ceiling prices which will be found in sub-paragraph (b) of Section 3, and in succeeding sections through Section 7. The necessity for maintaining customary price differentials is discussed in Section 9. Section 16 is devoted to record-keeping. Section 20 covers the subject of whether or not taxes imposed by law may be passed on to customers. Section 22 is devoted to definitions of terms used throughout the regulation.

General Overriding Regulation 10 is designed for industries which are excluded from C.P.R. Regulation 22. When G.O.R. 10 was first issued, it provided only for individual adjustments for a manufacturer "who cannot operate under ceiling price regulations without a loss on his overall operations." This restrictive provision was altered by Amendment 1 which strikes out the mandatory provision for denying relief except in cases where there is an overall loss showing. Now a producer may apply for relief if he has a loss position in the operation of separate plants or separate businesses in an integrated company.

EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

Part VII. Significance of CO and O: in stack gases

By VICTOR J. AZBE"

WITH THIS WE BEGIN to discuss rominimization in greater detail. The items presented would apply with slight variation about as much to rotary cement and rotary lime kilns and are informative to the vertical kiln operator as well.

The combustion engineer's first endeavors at increasing efficiency of a combustion unit are almost always directed at reducing excess air, as it is by this means that he may accomplish the quickest and the simplest

fuel saving.

In lime and cement operations excess air and incomplete combustion losses, when properly evaluated, reveal themselves as startlingly high. So the offhand assumption is that we do not want either CO, or O2, that a zero-zero condition is desirable. But the matter is not quite so simple. Many factors must be considered, such as allowable temperature from kiln upkeep standpoint, formation of slag rings, relative heat transfer from luminous and nonluminous gases, relative heat transfer from relatively hotter and cooler streams, the inherent tendency of the rotary to stratify its gaseous streams, the fact that almost always other combustible gases may be present with CO and the criterion that the important end of the kiln is really the upper end of the calcining zone and not the actual end.

In text books and catalogs of instrument companies we often see tables and charts referring to excess air and incomplete combustion loss. They all refer to systems of low temperature working head such as boilers in which steam may still be made at 400 deg. F., which in no manner ap-

plies to kilns.

Calcination Primary Concern

In this case our primary concern is calcination, which has a far higher temperature level. Compared to it our concern with preheating is secondary for the basic reason that if heat of calcination is wasted there will be no need for the lower temperature level heat of preheating. Thus it behooves us to conserve the lime making heat of high temperature elevation which is in short supply and evaluate losses on this basis.

The border line between heat of high and low elevation depends on the operation and type of lime made, type

of kiln and what the gas-lime temperature differential at the incipient point of calcination is.

This incipient point for high calcium lime would be 1500 deg. F. For dolomitic lime it would be less, depending on the sort of dolomite, some being of low temperature dissociation point about 1000 deg. F. and some at the higher dissociation point of about 1300 deg. F., all of course dependent on the prevailing CO2 concentration. Above this is the terminal differential which for a rotary kiln is high and for a vertical kiln, due to far more intimate contact of gases with the stone, is low. In general we may say that the following would apply:

	Gas temperatur leaving the ca cining zone, deg. F.
Rotary cement kilns	2200
Rotary lime kilns	2000
Vertical high calcium	1700
Vertical high tempera- ture dissociation dolo-	
mitic kilns	
Vertical low tempera- ture dissociation dolo-	
mitic kilns	1300

It is on the basis of these temperatures that incomplete combustion and excess air losses should be calculated, making them far higher than conventionally assumed. Calculated in this manner an inversion takes place. CO always was considered a greater source of loss than excess air. Often an O2 content of several percent was maintained to reduce CO to a mere trace. It now seems that O2 is a far greater source of loss than CO of equal percentage.

Unquestionably in theory a condition of zero Ozzero CO is desirable but that depends on heat transfer and other characteristics. It was stated that in the rotary kiln most of the heat is transferred by radiation from luminous gases and re-radiated from hot surfaces. Nonluminous gases have no great heat transfer effect. They are quite effective for transferring heat by convection which is virtually the same as conduction, but there is little of that in a rotary kiln due to limited surface and gaseous stratifi-

Radiation, of course, is from the hot stream to cool surfaces or spaces, meaning that radiation is down the kiln line into the preheating zone which in beneficial effect is mostly wasted. It is also to the cooler kiln walls, which, if they are cooler than the lime, is mostly all wasted again.

So, whenever we see in a kiln a surface which is cooler than the flame, it receives heat; and if it is cooler than the lime as well, all of the heat it receives is wasted.

The primary aim should be to burn in a manner conducive to maximum radiation, to maintain the entire kiln active, and to avoid stratified flow of gases in the degree that it may be pos-

Flame Adjustment

It is well for us to study the bunsen burner flame. If adjusted for intimate primary air mixing, the flame will be hot, short, but nonluminous and nonradiant. One does not need to resort to the use of a thermopile to note that such a flame does not radiate heat laterally in any substantial amounts.

On the other hand, with the burner adjusted for a long, CO containing flame, which, although mild, has a substantial warming effect and "throws" the heat well. It is not CO that does it, it is the carbon particle. One cannot be obtained without the

There is a limit however. Too dull, although luminous, a flame also lacks radiant power for lack of temperature. Since solid radiations vary as the fourth power of temperature difference, as long as there is any radiating carbon present, radiations increase tremendously with increase of temperature. Thus we do not want air to allow cracking of hydrocarbons and we do need it to obtain the tempera-

If we mix all the air in suddenly, we develop heat faster than it can be absorbed and at the same time destroy rather early its radiant power. On the other hand, if we give it the air too slowly temperature may be too low for effective heat transfer. If air is obtained very hot from an effective cooler one condition may prevail; if the cooler is inefficient an entirely different condition may prevail.

To mix all air with the fuel initially

is not desirable. Not to mix may mean that they may not become mixed, as the mixing of the gases in a rotary kiln some distance from the inlet is

^{*}Asbe Corp., St. Louis, Mo.

normally quite sluggish and the gaseous streams rather stratified.

Stratification

It is this stratification that brings on incomplete combustion even when there is ample air and creates the demand for excess air which often is supplied in excessive quantities.

It is not that CO in itself confers increased radiant power. It is only that CO is likely to be the result of hydrocarbon cracking under conditions of deficiency of air, resulting in a luminous flame. That is, it tends to be indicative, and thus within rather narrow limits it is better to have a slight loss due to incomplete combustion. This means that excess air, although it should be present, should be quite low. More excess air will eliminate incomplete combustion loss entirely, but it is likely to affect heat transfer characteristics of the gases.

But when there is less excess air or a final zero O_v-zero CO at the kiln end the result brought on by stratification may be that some of the gases leave the calcining zone having a high CO and others a high O_v content, thus wasting heat from the critical zone through both conditions.

All this depends on the kiln, the arrangement for initial mixing, kiln length, and kiln diameter. It is impossible to say what amount of excess air is needed but in no case should it be more than 10 percent. If more is required then the burner system is faulty.

One percent O_2 is about 5 percent excess air. Some maintain firing at 0.5 percent O_2 with the aid of new type oxygen recorders, when natural gas or oil, more easily regulated fuels than coal, are used.

Better Gas Mixing

When the kiln is quadrated by means of refractory tile extending into the calcining zone, the situation changes considerably. Better gas mixing is accomplished and flame as a radiancy factor in the preheating zone has lost some of its importance. When the arrangement is such, the operation may be for zero O-zero CO terminal conditions and any excess air, even a very small amount, would constitute a considerable and definitely calculable loss.

When there is a scale ring, excess air may be reduced and often is in itself reduced explaining in part the much better results then frequently obtained. Such a scale ring mixes the gases. A dam located further up the kiln, but still well within the calcining zone would also tend to mix the gases and reduce requirement for excess air.

Stratification in Rotary Kilns

A few possible examples of extreme rotary kiln gaseous stratifications are given below.

In one case four separate samples of gas were obtained as close to simultaneously as possible from different points of the kiln cross section at the junction between calcining and preheating zone. They were all different and as follows:

Sample	CO ₇	O2	CO
A	35.0	0.4	0
B	21.0	2.0	4.0
C	32.4	1.2	3.4
D	26.0	1.6	0.4

Undoubtedly there were still other streams higher in O_2 and also others higher in CO. In the very low O_2 streams unquestionably H_2 was also present.

We know entirely too little about this calcining zone junction but tests made by special means at the furnace outlet of an open hearth and glass furnace tanks which would correspond to this kiln junction revealed that outward pouring gases are far from homogeneous. The pyrometer may give them one temperature but actually there is a great range. There are flashes, streaks, and streamers of much hotter gases among those relatively cooler. A diversity of analyses such as the above would naturally bring on a diversity in temperature.

When a rotary kiln calcines dolomite, of which the CO2 from magnesium carbonate passes off rather early in the kiln, it is quite ordinary to find a much higher CO2 in the lower portion of discharge from the kiln. This shows that there is no pronounced mixing of the gases in the preheating section of the kiln. There may be turbulence early in the hot zone of the kiln which soon quiets down for a steady flow. The fact that, in the preheating section of the kiln, gases are nonluminous combined with the fact that they have little turbulence, indicates unsatisfactory conditions for good heat transfer.

Another and even more extreme ex-

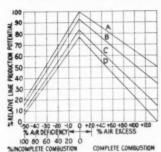


Fig. 30: Relative loss due to access oir and incomplete combustion. Letters refer to the following: (A) Basic potential for complete combustion, no excess oir and minimum 1500 deg. F. terminal temperature differential; (B) Vertical kiln high calcium lime, 1700 deg. F. calcining xone terminal temperature differential; (C) Rotary kiln high calcium lime, 2000 deg. F. calcining xone terminal temperature differential; (D) Rotary cament kiln, 2200 deg. F. calcining xone terminal temperature differential; (D) Rotary cament kiln, 2200 deg. F. calcining xone terminal temperature differential;

ample is presented by a 6- x 80-ft. rotary kiln using oil as fuel. Oil consumption was very high. Gases were analyzed and found to contain 10.8 percent CO₂, 11.5 percent O₂ and no carbon monoxide. This is an unusually high oxygen sample, but was correctly obtained and was unquestionably representative.

An effort was made to reduce the oxygen. More oil was turned on but smoke immediately appeared as well as CO in the gases. No matter what was done at the burner, or how the damper was adjusted, there was practically no change in the oxygen content even when there was considerable CO.

Then the burner action was studied. It was the type which gives a narrow flame, filling the center 3 ft. core of the 5 ft. internal diameter of the kiln. The products of combustion passed down this core, surrounded by a stream of air, with little intermixing between the two. Results were poor, about 12,000,000 B.t.u. per ton of lime being required.

However poor the results may have been, they should have been worse since 10.8 percent 0, for a rotary kiln represents a condition of such high waste from the calcining zone that there should have not been any lime at all. That there was still lime means that the excess air passed through the calcining zone as a separate entity, unmixed, in a form of a ring, surrounding the central much hotter, flaming core.

This central core was radiating its heat through the much cooler envelope of air to the lime and the kiln walls, a peculiar but frequently occurring condition. If the air envelope and the flaming core would have been completely mixed, the flame luminosity and the temperature would have been so low that there would have been no heat to transfer. But then, of course, the excess air could have been reduced.

Kiln Length Stratification

It was then assumed full kiln length stratifications could occur only with a short kiln, and with oil burners of narrow projection angle, but later it was found that longer kilns as well as wider burner angles are subject to this ailment.

In this case the kiln was 175 ft. long and 9 ft. in diameter, normally powdered coal fired, with fuel from the Raymond mill injected through a 12-in. pipe. However, as natural gas was available in adequate quantities during a substantial portion of the year, and because on a heat quantity basis natural gas was cheaper, it was to be used alternately with the coal.

The manner of injection was through the same 12-in. pipe with the primary air stream supplied by the operating mill fan, but of course with the pulverizer shut down.

Initial results were very poor. Plenty of gas was burned, lots of heat developed, but the flame was feeble and nonradiant. Then an auxiliary coal pulverizer was installed, a very small unit, enough to inject only about 300 lb. of pulverized coal an hour in with the gas and air stream. This improved luminosity and performance results, but still left much to be desired.

Kiln capacity was low, only about 165 tons per day. Heat consumption was high, 10,000,000 B.t.u. per ton. Terminal gas temperature was high also, 1650 deg. F. with very hot dust chamber and stack, indicative of secondary combustion.

Gas analysis by traverse across the kiln outlet revealed a serious state of segregation.

Position	CO ₂	O ₂	CO
1	22.0	0.2	0.0
2	21.4	0.0	0.0
3	21.0	0.4	0.0
4	17.5	0.9	0.0
5	16.8	0.7	1.0
6	15.5	0.3	2.9
7	11.2	0.3	3.8
8	13.0	0.0	4.0

At other times in one location CO_2 would be 8 to 10 percent with no oxygen and up to 5 percent CO and simultaneously in another location CO_2 of 25 percent with no oxygen and no CO, with samples taken no more than five minutes apart.

Almost every kiln has some such unapparent idiosyncrasy which interferes with its operation, and it is because of this that it is often said that no two kilns perform alike. It is because such matters are not delved into deeply enough that we hug so tenaciously to the 30-35 percent kiln thermal efficiency point.

We thus have proof that gases in the rear section of kilns stratify, that stratification exists through short kilns when the angle of fuel application is limited and also, that there is stratification in a relatively long and large diameter kiln, even when the feed pipe is as large as 12 in. if velocity of projection by the primary air stream is high.

Air Stream Acts as Jet

Fuel introduced into this primary air stream passes through the kiln too fast. If that is the case with the relatively fast burning natural gas, it must be more so in the case of powdered coal. The primary air stream acts as a sort of a jet projecting the fuel unduly fast through the calcining zone into the preheating zone. To have the stream hit the lime should help but it does not seem to correct it entirely.

In one instance, when studying combustion conditions at this calciningpreheating boundary, a sort of a live flame was noted to pass. Still, gas samples obtained with a water jacketed sampling tube gave but traces of combustible. Then it was decided that what was seen were residual portions of pulverized coal, still burning.

AIR SUPPLY PLUS OR MINUS THEORETICAL AMOUNT %			0	-10	-50	-30	-40	-50	+25	+50	+75	+100	+150	+200		
AIR USED PER LB OF CARBON BURNED, LBS				11.52	10.37	9.22	8.06	6.91	5.76	14,40	17.28	20.16	23.04	28.80	34,56	
AIR AND CARBON GAS WEIGHT, LBS.				12.52	11.37	10.22	9.06	7,91	6.76	15.40	18.28	21.16	24.04	29,80	35.56	
PORTION OF CARBON BURNED TO CO2-%			100	80	60	40	20	0	100	100	100	100	100	100		
	ON OF 0 - %	CARBO	N BUR	RNED	0	20	40	60	80	100	0	0	0	0	0	0
B.TU.	GENERA	TED M	AKING	CO2	14500	11600	8690	5795	2895	0	14500	14500	14500	14500	14500	14500
B.TU.	GENERA	TED N	MAKING	CO	0	881	1762	2642	3525	4407	0	0	0	0	0	0
TOTAL	L HEAT	GEN	ERATE	D	14500	12481	10452	8437	6410	4407	14500	14500	14500	14500	14500	14500
LOSS	DUE T	0 CO	B.T.U.		0	2019	4048	6063	8090	10093	0	0	0	0	0	0
ELEVA	ITIAL C	BOVE	ATMO	SPH.	4460	4220	3940	3580	3120	2500	3630	3055	2642	2320	1872	1570
GAS A	NALYSI	SBY	/OLUM	E CO2	20.86	18.12	14.87	10.94	6.10	0	16.69	13.91	11.92	10.43	8.34	6.95
80	88	11	11	CO	0	4.53	9.91	16.41	24.43	34.51	0	0	0	0	0	0
82	- 11	10	0.0	N ₂	79.14	77.35	75.22	72.65	69.48	65.49	79.14	79.14	79.14	79.14	79.14	79.14
11	83	8.0	61	02	0	0	0	0	0	0	4.17	6.95	8.94	10.43	12.52	13,91
CALCI	NING Z	ONE TI	ERM. T	EMP.	RELAT	VE LIN	NE PRO	DUCTIO	N (POT	ENTIAL)						
1500	°F. BAS	SIC			100%	84.0	67.5	51.5	36.0	19.1	90.00	78.3	69.0	58.2		
1700 °F. VERTICAL HC KILN			93.4	77.5	62.2	46.8	30.9	15.5	81.3	68.8	56.2	43.8				
2000°F. ROTARY HC KILN				83.5	68.7	54.3	39.5	25.0	10.1	69.0	54.3	39.2	24.7			
2200	F. CE	MENT	KILN		77.2	62.7	48.5	34.5	20.5	6.6	60.5	44.6	28.2	12.0		

Table I. Products of combustion of carbon with and without excess air or CO (theoretical temperatures, volumes, heat losses)

Such carbon would also constitute incomplete combustion loss from the calcining zone, would tend to heat up unduly and unnecessarily the preheating zone. But no way has yet been found to measure and evaluate it.

The aim should be as much as possible for the fuel-air stream to pass down the kiln on a uniform front of approximately equal velocity containing no excess velocity streaks. The fuel should be distributed, although not intimately so; the mixing should be by diffusion which results in highest radiancy through heat dissociation of hydrocarbons and release of carbon.

Taking natural gas, which is ordinarily mostly CH,, a hydrocarbon of lowest carbon content, it is notorious in the fact that it gives the best vertical kiln and worst rotary kiln performance. The reason for this is that when improperly applied its burning is virtually flameless, but it can be made luminous as well.

Improper Application Harmful

In the case of the above 175- x 9-ft. rotary kiln fired with natural gas, which serves as such a splendid example of what the conditions should not be with any fuel, improper application had a whole series of harmful consequences.

First, gas was admitted through the center fuel injection pipe at a high velocity of projection which caused stratification and delayed burning.

Second, simultaneously, to the extent of the oxygen content of this primary air stream, the gas burned, short, hot and nonluminous.

Third, there was a loss from the kiln due to CO and particularly so from the calcining section.

Fourth, invariably in cases where hydrocarbon gas is the fuel, loss due to CO is attendant by a high loss due to H₂ as well. The fuel ratio at which

the kiln operated and the low CO₂ obtained reveal that hydrogen must have been present in considerable quantities.

Fifth, the general air deficiency with no stream having any excess air, incomplete combustion, nonradiant burning, stratified flow, caused low fuel economy in itself which in turn reflected in poorer kiln capacity.

Sixth, if there had been ample air or excess air, due to stratification, much of this air would have passed through the calcining zone uncombined and would have carried heat into the preheating zone and although there complete combustion may have taken place, in general, conditions as far as the calcining zone is concerned would have been worse.

Multi-Burners Offer Remedy

What precisely can one do to remedy such conditions as were here illustrated? In almost all cases it seems that multi-burners are virtually dictated which is simpler to accomplish in the natural gas case than any other except probably that of oil, in which case a wider jet intercepting the air stream as a whole would have been the answer.

In the case of natural gas, its introduction through the primary air system could be continued for half the gas. This would probably attain a state of high temperature in the kiln. This center stream would he hot but not particularly luminous. The remaining half of the gas should be introduced through five separate pipes directed into the kiln concentrically with the main pipe and directed to project the gas into the space between the kiln wall and the main center stream. It should be directed, so to speak, into the idle void prevailing in all kilns.

The auxiliary gas streams are how-

FUEL ECONOMY -

ever to be all gas, containing no air as is found in the center stream. They are to enter with minimum of turbulence from relatively large pipes, at low velocity to avoid too early disruption.

Introduced in this manner, the outer portions of the stream in contact with air will burn, while the inner portion will crack, creating a brightly luminous flame. Introducing it in this manner will also accomplish distribution and, provided gas is not excessive in amount, will result in complete combustion within the calcining section which should be further assured through pre-terminal mixing either through quadrants or a substantial dam.

Regardless of the fuel, however, the ideal is that air should pass down the kiln at a uniform velocity, while the fuel is admitted into the stream properly distributed and with its rate of mixing with air controlled for attainment of the flame condition most desired. The precise manner of introduction in all cases should be determined by the engineers and operators.

Excess and Deficiency of Air

Table I presents volumes and weights of products of combustion, heat developed and potential temperature attained when carbon is burned with excess air and also a deficiency of air. From this the "relative lime production potential" is calculated using, as a 100 percent basis, complete combustion of carbon without excess air, developing at a mean specific heat of 0.26 a potential (not actual) temperature of 4460 deg. F., the gases escaping the calcining zone at zero terminal temperature differential of 1500 deg. F. The relative amount of high level heat is equal to 4400-1500 times the weight of combustion products which is taken as 100 percent relative potential on which all other potentials are based.

The tabulation is extended for the different ranges of excess and deficiency of air and for three practical calcining zone terminal temperature differentials, 1700 deg. F. for vertical high calcium kilns, 2000 deg. F. for rotary high calcium lime kilns, 2200 deg. F. for rotary eement kilns which may have an even higher terminal differential and so a greater loss. Fig. 30 presents graphically the relative lime production potential.

We may say that, practically speaking, any carbon burned to CO in rotary kiln operation is a complete loss or even more, since the CO may be accompanied by H_z. Still, bad as this is, the loss due to excess air is worse, and at 2200 deg. F. terminal differential 1 percent of O_z in the escaping gases will represent a 10 percent loss while for 1 percent of CO the loss will be only about 5 percent. So to carry a high O_z to avoid traces of CO is not reasonable, particularly as that could

be as well accomplished by burner manipulation or rearrangements, dams and quadrants. It particularly is not logical since CO may be indicative of a more desirable flame. Let's not forget the old fireman who wanted a long, rich flame.

The difference between CO and O_2 loss is that in the case of CO the loss is mostly in undeveloped heat, that is a direct fuel loss. In the case of excess air however, the loss is in high value heat carried out of the calcining zone, and since every unit of this heat would have made lime the loss in production is tremendous. This is not brought out in the heat balance. It is only revealed by the lime loss balance which we hope to be able to cover eventually in an adequate degree.

Loss Due to Excess Air

For the present we give only the following intimation:

Basis of carbon 14.	500 B.t.	1./lb.
	No excess air	25 percent excess air
Products of combustion,		
lb.	12.52	15.40
Heat capacity/lb. at 2200	6260	2200
deg. F., B.t.u. Excess air heat loss, B.t.u.		7700
high heat value	0	1440
1440 x 1.4		
Lime loss lb.	- 0	1.53
Actual ratio at 8,000,000		
B.t.u./ton		3.63
Loss due to excess air of		
lime produced		46.3

Of the above multiplier 1 is high value heat at 0.4 low value heat lost due to high value heat waste, making a total of 1.4 as the 0.4 becomes available as high value heat after return from the cooler.

Advisory Committees

THE OFFICE OF PRICE STABILIZATION recently announced the appointment of advisory committees for the sand and gravel and the ready-mixed concrete industries. The advisory committees are O.P.S. committees and were appointed by Deputy Administrator Gilbert. Advisory committees are required by law to be representative in a geographical sense and of the small, medium-size and larger companies in the industry. At least one member of a committee is required to be a non-member of the national association of the industry, and association employes are ineligible for appointment.

The first advisory committee meeting for sand and gravel was held August 16, at O.P.S. headquarters in Washington. The ready-mixed concrete advisory committee met in Washington under O.P.S. auspices on August 14.

An advisory committee has an important responsibility. It gives O.P.S. an informed judgment about the practical problems of the represented industry. O.P.S. intends eventually to scrap the General Ceiling Price Regulation and to substitute "tailored" price control orders for all industries which are not under G.C.P.R. The advisory committee has the job of persuading O.P.S. to develop an order which will be realistic of the industry's case and give an effective procedure for obtaining price relief.

The sand and gravel advisory committee consists of: F. N. Andersen. president, Andersen Sand and Gravel Co., Saginaw, Mich.; Charles E. Brady, partner lessees of B. V. Hedrick Sand and Gravel Co., Lilesville, N. C.; Thomas A. Butt, treasurer, Smoot Sand and Gravel Corp., Washington, D. C.; Otto S. Conrades, president, St. Louis Material & Supply Co., St. Louis, Mo.; E. K. Davison, J. K. Davison & Bro., Pittsburgh, Penn.; William J. Doyle, Jr., Tulsa Sand Co., Tulsa, Okla.; William Edward Hole, president, American Aggregates Corp., Greenville, Ohio; Richard K. Humphries, vice-president, Pacific Coast Aggregates, Inc., San Francisco, Calif.; J. D. Lewis, president, American Sand and Gravel Co., Hattiesburg, Miss.; Frank Pene-packer, vice-president, Pacific Building Materials Co., Portland, Ore.; Thomas E. Popplewell, Fort Worth Sand and Gravel Co., Fort Worth, Texas; George W. Renwick, president, Chicago Gravel Co., Chicago, Ill.; Walter L. Smith, Memphis Stone and Gravel Co., Memphis, Tenn.; Harris N. Snyder, vice-president and treasurer, The Buffalo Slag Co., Buffalo, N. Y.; J. Rich Steers, president, Steers Sand and Gravel Corp., New York, N. Y.

The ready-mixed concrete advisory committee consists of: C. J. Tate, secretary-treasurer, Thompson King-Tate Co., Lexington, Ky.; Robert C. Collins, general sales manager, Warner Co., Philadelphia, Penn.; John F. Fisher, vice-president, Superior Sand and Gravel Division, Fisher Contracting Co., Phoenix, Ariz.; Norman J. Fredericks, secretary-treasurer, Koenig Coal and Supply Co., Detroit, Mich.; William J. Henry, vice-president, Ready Mixed Concrete Co., Raleigh, N. C.; Herbert G. Jahncke, vice-president, Jahncke Service, Inc., New Orleans, La.; Walter M. Keeler, president, The Walt Keeler Co., Inc., Wichita, Kan.; Frank L. Kelley, vice-president, Colonial Sand & Stone Co., New York, N. Y .: Robert Mitchell, president, Consolidated Rock Products Co., Los Angeles, Calif.; William Moore, president and treasurer, J. P. O'Connell Co., Boston, Mass.; Robert F vice-president, Harry Porter, Campbell Sons' Corp., Towson, Md.; John H. Rudolph, secretary, Concrete Supply Co., Inc., Evansville, Ind.; Louis C. Schilling, president, I. E. Schilling Co., Miami, Fla.; A. R. Shiely, executive vice-president, Guaranteed Concrete Co., St. Paul, Minn., Charles W. Shirey, president, C. W. Shirey Co., Waterloo, Iowa.

Part VII. Kennecott Copper Corp., Ray, Ariz., uses three tailing ponds for 6000 tons of feed per day



The tailing pand of the Ray Mines Division, Kennecott Copper Corp., Haydan, Ariz., is on the bank of the Gila river and covers 1000 acres

CONTROL OF TAILINGS FROM WASHING PLANTS

By WALTER B. LENHART

THE CRUSHING-GRINDING operation and concentrator of the Ray Mines Division of Kennecott Copper Corp. are at Ray, Ariz., on the Gila river. The ore treated is a porphyry and the specific gravity of the tailings, fineness, etc., parallels those of other copper porphyry operations. The method of tailing control here differs from any previously described, in that the tonnage stored as compared to the size of the area available for storing tailings is relatively small. The tonnage going to the three ponds is roughly 6000 tons per day and very soon this will be stepped up to 9000 tons, and eventually to 15,000 tons per day. At the time of inspection there were available about 1000 acres of relatively flat land for tailing disposal use.

At the start of the tailing control program, the meandering course of the Gila river was straightened by use of draglines, dikes, etc., and the area formerly overflowed and cut up by the river when in flood now makes up a good part of the storage ponds. The area has been divided into three ponds and all sides of the area are diked.

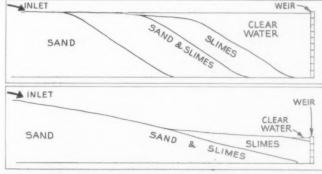
In the earlier operations the company simply built up a dike of earth and allowed the pulp to flow into the area nearest the plant. The sands settled in a ridge that almost bisected the pond, and the slimes and clear water flowed over against the preliminary dike, where the clear water was taken off over the top of weirs. No water is reused there and the only reason for impounding tailings is to keep them out of the drainage systems. This is the type of tailing pond most often encountered in the rock products industries, although the area available for storing tailings here is not nearly so large.

As time went on the outer dike had

to be built up occasionally. The material available for building was the sand in the pulp itself. In a large area of this kind, with the inlet to the pond essentially at the maximum distance from the outlet, it is desirable to build up the sandy material near the berm where the dragline, or tractor and dozer, can handle it without too much difficulty. Here the ingenuity of the operator, or caretaker, came into play, and over the many years of experience the company has worked out its own method of controlling the flow of pulp to get enough of the sand near the berm. By having three ponds and overflow weirs at strategic spots the company can use two of the ponds and let the third one dry out, even if it takes from three to six months for it to dry to the degree where a tractor can work inside the berm. The large area at Hayden, plus the extremely high evaporation rate in the hot dry section of the desert, are probably the main reasons why this system has proved suitable to date.

To illustrate the technique: Fig. 1 shows the approximate appearance of the pond being filled (in cross section). The weir has been built up to a high point and there possibly is some segregation of the sand from the sand-slimes with some of the true (and man-made slimes) as indicated. By a very cautious and gradual withdrawal of the clear water over the weir the slimes form a steep bank as shown. If the weir is suddenly lowered there is a rush of water through the area, and at the same time, the "hold-area,"

Continued on page 1481



Elevation of tailing pond. Fig. 1, top: The approximate condition of the pond while filling it. Any clear water is skimmed off at the outlet weir. The sitmes are held back somewhat by the lack, valuality. Fig. 2, bottom: If the weir is lowered and the rate of withdrawal is rapid, the rush of water tends to drag enough sand near the berm so that when the pond is dry it can be recovered with a tractor and dozer and the material used to build up the berm

Apparatus for Quick Determination of Plasticity of Masonry Cement Mortar

REFERENCE TO THE TWO pieces of apparatus to be described herewith appeared in the August issue of Rock Products under the article summarizing the highlights of A.S.T.M. June meeting in Atlantic City. The Plasticimeter and the mixer blade-wiper combination were demonstrated before several of the working committees of Committee C-1 and appeared to arouse sufficient interest to warrant a review of the proceedings for the benefit of those unable to attend these particular sessions.

The Plasticimeter so far has found useful application only in the determination of workability or plasticity of masonry cement mortars, and then only for the purpose of anticipating the reaction of the mason with respect to ease of placement of the mass on the job. The apparatus successfully differentiates, on a quantitative basis, this characteristic between various types of masonry cements in the standard mortar mix and therefore provides an excellent tool for the manufacturer to control this quality in his product.

It might be well to point out that the terms "plasticity," "Plasticimeter" and "workability" are used rather loosely in this article. The equipment undoubtedly measures this property to some extent, but it would be extremely hazardous to use these expressions without proper qualifications in view of the many complex physical aspects of the mechanism when considered in the light of such characteristics as plasticity, pseudo-plasticity or thixotropy, inverted plasticity, viscosity, consistency, mobility, and perhaps others. This, incidentally, has given rise to the alternate rather prosaic expression "MOP" when referring to the apparatus, derived from the words "mason's opinion predictor" which function it appears to fulfill most satisfactorily.

The fundamentals of the equipment are not original with the author. In 1944 W. J. D. Reed-Lewis gave the writer detailed information covering his Mobility Gauge after which the present model is patterned. The originator of this idea expanded the use of his similar equipment into the evaluation of a number of other echantal more are used to aid the user in the more scientific fabrication of cement structures, and

By G. C. WILSNACK®

his accompanying treatise on the subject is a classic in this field. However, despite the possibility of its many other useful applications, the need for an apparatus to specifically evaluate masonry cements was apparent. Therefore, the original construction was altered to some extent to meet the demands of the problem at hand as simply as possible, with an accompanying rapid calculation to determine the superiority of one masonry cement over another with respect to plasticity or workability-characteristics so easily established on the basis of opinion in the field and so difficult to measure in the laboratory. While on the subject of fundamentals, it might be well to point out that the Vicat apparatus for the determination of normal consistency in hydraulic cements, the modified Vicat apparatusperforming a similar function in A.S.T.M. gypsum testing procedures, the Fisher-Gardner Mobilometer, and perhaps other devices, all embody the same principle.

Description of Apparatus

The picture shown on page 115 gives sufficiently clear mechanical details of the equipment so that only limited explanations will be necessary. The total weight of the plunger assembly is 1263 g. If no provision were made to counterpoise this loading, quite obviously it would be impossible to determine load-penetration relationships at values below this figure-a condition which is brought in focus by a study of the "A" masonry cement mortar in the graph. The counterpoise weighs 783 g. and consists of a bucket containing lead shot patterned somewhat after the shot container in the usual briquet tension machine. It is quite obvious that by the addition of 480 g. of shot to this bucket, the system is in weight equilibrium. This bucket is large enough to hold an additional 6000 g. of shot which, to discharge rapidly and uniformly from the orifice, must be close to 0.02 in. in diameter. A twin electromagnet is attached to the top as shown which stops the flow of shot by means of a conical shut-off device machined to fit the discharge orifice merely by completing the circuit passing through the two spools of wire from four 11/2volt dry cells connected in series. Control of the shot discharge is readily established by means of manipulating an ordinary snap switch conveniently attached to the base of the assembly This method of controlling weight application to the plunger serves two useful purposes. In the first place, any load can be imposed on the plunger simply by releasing shot up to the desired point as indicated on the spring scale. In the second place, it is the only means by which a gradual load, starting from zero and increased thereafter as desired, can be applied to the plunger without thereby disturbing the mortar mass under test. Curve B1 in the chart could not have been obtained without such a device. Additional comments on this particular phase of the apparatus will be given later in the article. Spirit levels, permanently attached to the penetration equipment, maintain the plunger rod in a vertical position at all times, while two roller bearings, spaced approximately 81/2 in. apart, furnish the required rigidity to the shaft with a minimum of friction. The apparatus as shown permits a maximum load application of 6000 g., which is adequate for ordinary testing purposes; by disconnecting the shot bucket, weights up to 10,000 g. can be successfully imposed for investigating mixes beyond the zone of acceptable masonry cement mortars.

Details of Apparatus

The plunger is 5.50 cm. in diameter with an area of 23.76 sq. cm. The metal container is 9.525 cm, in diameter with an area of 71.26 sq. cm. and like the plunger is 12.7 cm. in height. Thus the area of the cylinder is three times that of the plunger. The annular area of the ring of mortar between the metal wall contacts is therefore 71.26 23.76 = 47.50 sq. cm. When the plunger penetrates the mass to the extent of 1 cm. it displaces 23.76 x 1 = 23.76 cu. cm. This will raise the mortar in the annular space 47.50 h = 23.76 = ½ cm., or the mortar will be elevated above the original level exactly 1/2 the distance of the plunger penetration. This may be expressed as P/2, if P = depth of plunger drop.

To have uniform testing conditions it is necessary to control the path of the mortar as it rises above the container so that it will at all times be in contact with the metal surfaces of both plunger and vessel. Depending

^{*}Director of research, Ideal Cement Co., Denver, Colo.

on the consistency and plasticity characteristics of the mortars, some will have a tendency to slide upward along the surface of the plunger while others will break away and fan outward out of contact. This situation will obviously bring about variable frictional resistances and therefore affect the total energy expenditure at any one penetration. To establish uniform conditions at all times it was therefore considered advisable to insert a snug-fitting removable collar extension to the cylinder so that the ring of mortar will at all times be restricted in its upward travel. This collar is slipped into place after the mortar has been properly consolidated, leveled off at the surface, and the plunger set at zero at exactly the top area contact with the mass. Since this metal surface contact must be maintained throughout the test, it is quite obvious that a limit is encountered beyond which the plunger cannot be permitted to penetrate.

If L = the length of the plunger, then P + P/2 = L. This means that the cm. plunger penetration, plus the height of the extruded mass, must be equal to the length of the plunger cylinder to have the mortar completely in contact with the plunger all the way at the maximum penetration point. Since this length is 12.7 cm., P in above equation is 8.47 cm. Also, the collar must be at least P/2 = 4.23 cm. in height. This distance therefore represents the maximum depth of penetration for any one test. For convenience this upper limit is taken at 8 cm. which incidentally leaves a cushion of 4.7 cm. of mortar underneath the plunger, thus permitting normal movement of the mass under stress at the highest permissible penetration.

Impact Yest

Preparation of the mortar for the R.P.I. (Relative Plasticity Index) test closely follows present A.S.T.M. specifications for masonry cement, C 91-49, Sections 23 (a), (b), and Section -with the exception that instead of the 100-115 flow, this is restricted to 105-110. In recent experimental work performed in this department, the hand-mixing operation was replaced by machine mixing with the device shown in the photograph on page 117. Speed of rotation of the main shaft is 80 ± 2 r.p.m. Otherwise, this type of sample preparation is identical with the manual operation so far as composition of the mortar, mixing and rest periods are concerned. The mortar batch thus prepared is then placed in the cup to overflowing, after which it is uniformly rodded 25 times with a 14-in, metal rod in the conventional manner. Additional mor-tar is then added and the cup and contents placed on the flow table, which has been covered with a round piece of 4-in. felt to avoid marring the table surface, and dropped ten times. The surface is subsequently leveled

Plasticimeter which has found useful application in determining workability of masonry morters

off and the cup inserted in the recess provided in the base of the Plasticimeter. It is of some importance to time the operation up to this point since hydration reactions set in practically immediately after the cement is brought in contact with water. A certain restriction must therefore be

placed on the length of time consumed in the preparation of the specimen. Familiarity with the manipulations involved will eventually bring about a time lapse of just about 5 min. ± 15 sec. between initial water addition

and plunger drop.

The position of the plunger in relation to the mortar surface is permanently fixed by the trigger contact with a notch in the plunger shaft, so that the bottom plane of the plunger is exactly in contact with the mortar surface at the beginning of each drop test. The trigger is released and the penetration reading taken at the end of 30 sec. The instrument is so constructed as to permit proper seating of the extension collar to the cup prior to making the drop. With the system in a counterpoised condition, release of shot from the shot bucket will enable the application of any desired load up to 6000 g. as indicated by the spring scale.

Gradual Load Application Test

Preparation of the mortar specimen and all subsequent steps up to the point of the plunger release are identical, in this case, with the preliminary

manipulations required by the impact test. By turning the snap switch to the "off" position, which opens the electrical circuit, shot is released through the %-in. orifice at the rate of approximately 80 g. per sec. This flow can be stopped at will simply by closing the circuit at any desired penetration of the plunger. Curve B1 gives an example of scale readings versus applied weights and indicates the points at which the penetrations stopped after the flow of shot was interrupted. At the start of the test, it is comparatively simple to obtain related readings in a precise manner. Up to 0.8 or 1.0 cm. of penetration, stopping the flow of shot also stops any movement of the plunger. This favorable condition, however, does not continue much beyond these points. Thereafter continued load application will start a barely perceptible movement of the plunger which, if the shot is cut off immediately, will gain in momentum until the indicator needle finally comes to rest at perhaps 2.5 or 3.0 cm. This type of movement then continues to the completion of the test. Under certain conditions the penetration-load coordinates may leave so many gaps on the chart that it is at times necessary to repeat the test three or four times to fill in the intervening necessary points for the proper construction of the curve.

Calculations to Establish Relative Plasticity Index

All masonry cement mortars tested by the Plasticimeter have indicated strongly that a linear relationship exists between plunger penetrations and applied loadings between depths of 4 to 8 cm. This fact is quite apparent by a casual glance at the various curves in the accompanying chart. It must not be assumed, however, that ordinarily only three or four coordinates are required to establish the slope of the line. It is sometimes necessary to run as many as eight separate batches before this can be accomplished, and then considerable judgment may be required to eliminate false values. The apparatus is not responsible for this unfortunate condition but rather it is traceable to other manipulations involved in the testing procedure up to the point where the plunger is released. Temperature changes in the laboratory affecting hydration rates, inability to uniformly consolidate identical mortar masses to the same degree, all introduce variables in the plasticity characteristics readily detected by the sensitive mechanism of the apparatus. The unit weight of the mortar mass, prior to the drop test, should be checked in each instance, and if it can rightfully be assumed that differences in these weights are entirely attributable to a variable air content, this may vary from 0.50 to 0.75 percent during any one test series. If this is true, the apparatus is delicate enough to detect such differences. It might be well to point out that to make plasticity comparisons based on straight-line plottings, penetrations less than 3 cm.

must be disregarded. Curve B' clearly shows that this straight-line relationship does not become effective until a plunger depth of at least 2.5 cm. has been reached. Therefore, to safely base the calculations on true linear values, the minimum point of 4 cm. was established. The maximum penetration at 8 cm. has already been fixed as the upper limit in the discussion.

Having established from penetration data the prevailing straight-line graph for any one mortar under test, it is quite obvious that the work performed is proportional to the area of the trapezoid, bounded on the right by the sloping penetration line, on the top by the 8 cm. line, and on the bottom by the 4 cm. line. The vertical zero loading line at the extreme left then closes the figure. It must be distinctly understood, however, that the area of this figure will not give relative R.P.I. units in terms of work performed. It is necessary therefore to further translate the significant values into units of work which, in this instance, can be conveniently expressed in the gram-centimeter system. The values thus obtained are then arbitrarily divided into one million and the quotients assumed to represent the R.P.I. of the mortars. Specific details of the calculation are omitted because of obvious simplicity.

Discussion of the Curves

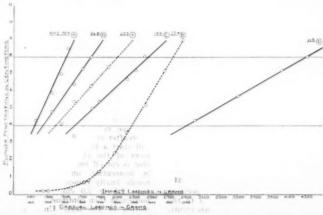
Curves A, B, C and D are representative of the same masonry cement mixture containing different percentages of an air-entraining agent, so that between mixes A and D there is a difference of 19.9 percent air. The R.P.I. values are noted on the chart to the left of the identifying letters. It is quite evident that this lower air content is responsible for a difference of 19.6 in the R.P.I. results. Mortars B and C have, respectively, 4.9 and 14.7 percent less air than A. This masonry cement sample was com-

pounded in the laboratory from portland cement and limestone of known physical and chemical characteristics. In this instance, information was sought concerning the effects of special treatment of the component parts, in the hopes of improving the plasticity of the resulting mortar when compared with a similar mix ground in a commercial mill. Curve X represents such a sample and while it contains 2.1 percent more air than sample B, it is 3.5 points lower in plasticity. This series of results is mentioned primarily for the purpose of pointing out the opportunity afforded the manufacturer in obtaining com. parative and vital information regarding his products. It might be of interest to mention that ordinary No. 1 type cement mortar, prepared to the standard flow, will give an approximate R.P.I. value of 2.0. A plasticity index as low as this is not measurable to any satisfactory degree of accuracy with this apparatus, therefore, the result mentioned herewith must be considered as only approximately correct. Directly superimposed loads up to 10,000 g. were required in this test, far beyond the safe operating capacity of the equipment. However, it does give some idea as to comparative values.

In rating masonry cements with respect to plasticities, an arbitrary standard can be set up for operating control purposes. Such a classification might assume R.P.I. values above 24 as too plastic; between this figure and 22 as excellent; from there to 20 as good; with a low value of 18 as acceptable. It is difficult to conceive as satisfactory a standard masonry cement mortar which shows an R.P.I. value below this lower limit. This rating merely constitutes an opinion and is, of course, subject to individual adjustment.

The advantages of conducting this test under gradual loading conditions are at once apparent when consideration is given the fact that only one batch of mortar need be prepared to supply all the information necessary for the construction of a complete curve, as illustrated by Curve B1. However, with our present knowledge, this method cannot be successfully applied in establishing R.P.I. values where the mortars involved fall in the zone of the harsher masonry mixes. It will be observed that there is a difference of 1.4 points in plasticity between identical mixes represented by curves B and B1, established by the two methods. As the R.P.I. by the impact test decreases, this difference steadily increases so that at a value of 11.3, representative of Curve D. the 6000 g. loading capacity of the apparatus is exceeded.

It is recognized that any method which attempts to evaluate the plasticity characteristics of mortars by this method, must necessarily be of an empirical nature, and such is un-



Plunger penetrations in em. versus impact and gradual foodings in g. using the Plasticimeter

doubtedly the case with the impact test. However, this does not detract from the value of the information thus revealed because, in the final analysis, these figures establish the desired facts on the basis that one cement is better than another. If the gradual loading test were to provide a different set of figures equally empirical but, of course, reproducible-then this test method would appear by far the more promising. However, it is highly likely that, with the present construction of the plunger, this desired aim cannot be attained. More experimentation is required along these lines and it is conceivable that by changing the shape of the plunger, especially with respect to the flat base plate, to one in the form of a hemisphere or cone, the entire picture correlating penetration to applied load might change. In this case, while the results would still be of an empirical nature, a more reasonable correlation might be obtained when testing mortars over wide ranges in plasticities. More experimentation along these lines is required and changing the shape of the plunger base plate offers some interesting possibilities. Another avenue for future experimentation lies in reducing the size of the cylinder so that plasticity characteristics of ordinary No. 1 type cement mortars may be investigated.

In conclusion, the writer feels that this apparatus is a valuable laboratory tool which, with further usage, may give us a clearer insight in the realm of masonry cements, and other types as well. In making this statement, the author is not unmindful of the fact that other devices may give equally satisfactory or perhaps better information than is presently revealed by this instrument, and if this article stimulates interest in this direction, a useful purpose will have been served. It might be of interest to quote the definition of plasticity as given by one authority. The statement is made that: "Viscosity is the resistance of a material or mixture to flow, when force is exerted upon it, and plasticity differs from viscosity only in the fact that when a constantly increasing force is imposed on the material or mixture. a definite yield point must be reached before flow is established." In light of this definition Curve B1, with its low penetration points up to appreciable loading values, creates the impression that, in a broad sense, it complies with these demands. If this is true, then there is some indication that the Plasticimeter actually measures, to some extent at least, the property in masonry mortars after which it is named.

Mechanical Mixing of Mortars

It is not the purpose of this article to promote the use of any particular mechanical mixing device for the preparation of the various mortars required by present A.S.T.M. standards. The assembly shown in the ac-



The mixer blade-wiper combination has proved satisfactory for the preparation of various mortars

companying photograph has proved highly satisfactory for this purpose and this whole matter is discussed solely for the purpose of stimulating interest in this much neglected phase of our A.S.T.M. cement testing program. The need for such a device is apparent and the statement can at least be made that the equipment to be described has excellent possibilities of meeting the requirements.

The only part of the apparatus which needs a brief description is the mixer blade-wiper combination. This assembly, made entirely of brass, is attached in the usual manner to the mixer shaft. The shield-shaped blade which closely fits the contour of the bowl is provided with eight arms, each ¼ in. wide. They are staggered, as will be noted from the picture, so that a maximum amount of mortar is subjected to agitation with a minimum strain on the blade and shaft. The paddle itself, while adequate to mix the mortar with which it comes in contact, cannot possibly bring within its orbit of movement any mortar which finds its way up the side of the bowl beyond the reach of the rotating mechanism. Therefore, no matter how effectively the paddle does the job, the mortar sample thus produced can never be entirely representative of the original mix. On the other hand, if all the mortar remains at all times within the path of travel of the blade, then near metal to metal contact between paddle and bowl is entirely satisfactory since the mortar being moved by the rim will clear its own path and at least three times during each revolution with this particular mixer, return substantial masses from the outer zone into the main mixing area. It is therefore necessary to clean the wall beyond the reach of the paddle of any adhering material before this system can be considered adequate for the purpose intended. The rubber wiper attachment shown in the photograph is an effective device for this purpose.

The wiper proper is attached to the main collar of the upper section of the blade shaft. It is securely fastened in place with two Allen set screws. It is locked into position about 1 in. behind the leading side of the paddle and is further amenable to two adjustments. The setting can be made at any desired angle so that a downward thrust can be exerted on the mortar it removes from the upper wall of the container. It can be fixed permanently in position by a lock nut which unfortunately is not clearly shown in the picture. The slot arrangement operating on the swivel principle permits further adjustment of the rubber contact with the contour of the bowl and this setting can also be made secure by tightening a machine screw clearly shown at the lower end of the slot. The rubber wiper is made of 3/32 in. Garlock stock 14 in. wide and 2% in. long and is simply attached to the metal extension of the slot end of the device by a thin metal strip and three machine screws. The rubber eventually requires replacement but is ordinarily good for at least 50 mix operations. The width of the rubber strip should be about 14 in. beyond that required to barely make contact with the wall of the bowl. This lengthens the wiping stroke to about 11/2 in. for each of the three contacts made per revolution.

It is good practice to start the mixing operation by adding about 200 g. of the required sand to the water before introducing the cement to avoid gumming up the bottom of the receptacle with a thin layer of heavy cement paste, which the lower part of the blade cannot effectively reach. Only cement mortars of over 90 percent flow have so far been satisfactorily prepared in this device although it is entirely possible that somewhat stiffer mixes can be handled equally well.

The details of manual mixing demanded by various A.S.T.M. procedures for mortars in the region of the higher flow values can be exactly duplicated by the use of this machine, provided the speed of rotation is standardized. The suggestion is made that one or more of the laboratory personnel establish flows and air contents of mortars prepared with both regular and air-entraining cements in the conventional manner and then set the speed of rotation at a point where these values are reproduced by the machine.

Sand and Gravel-



Plant as seen from the chip plant. Note the various positions where radial stacker conveyors are used to fill either truck-leading bins or to build stockpiles. New concrete batching plant is being built at right

Radial stacking conveyors and rubber-tired loading equipment highlight new truck shipping plant of Elmhurst-Chicago Stone Company

By L. DAVID MINSK

STOCKPILING SAND AND GRAVEL IS THE ANSWER TO LOW COST PRODUCTION

TRENDS IN THE PRODUCTION of sand and gravel during the past decade or more have continued toward meeting stiffer specification requirements and demands for more sizes of product. There are requirements, as well, for differences in product characteristics within a given size range, such as demands for varying percentages of crushed particles and overlapping sizes, which complicate processing.

Most plants have had to adapt operations as best they could to the changing demands as they arise, with the result that best over-all efficiency is not usually attainable. These problems of producing multiple products are being met successfully and economically by the new Barbers Corners plant of Elmhurst-Chicago Stone Co. shown on the front cover. It has a design that goes much further than ordinary practice in providing the flexibility to meet any conceivable specification that might be written in the immediate future.

The company has had more than 25 years experience in producing sand and gravel and crushed stone. The design of the new plant was by Smith Engineering Works; management of the company incorporated many of its own ideas in the general design. George and Martin Hammerschmidt, president and secretary respectively, H. E. Manahl, general superintendent, and Jake Schramer, plant superintendent, all had part in the preliminary basic design.

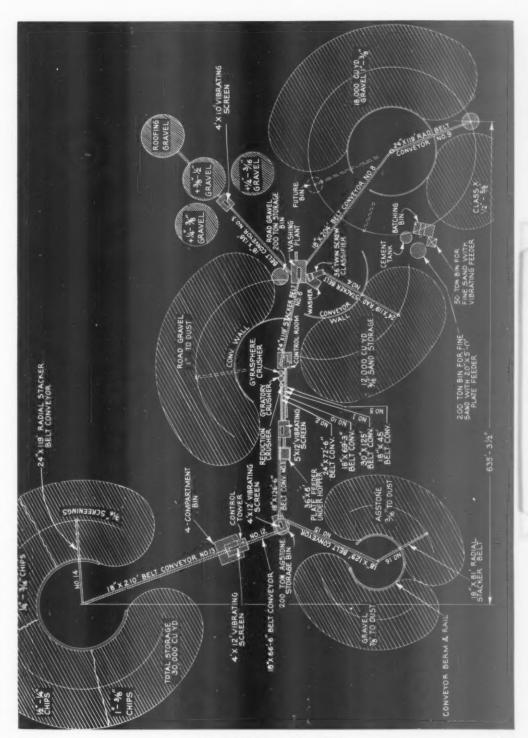
The flexibility required is obtainable through a design featuring the extensive use of radial stacking conveyors for direct loading into various live storage bins or into stockpiles, and a layout that does not require screen cloth changes in producing a wide variety of products simultaneously

Production is 250 t.p.h. of 14 sizes of gravel and sand including unwashed as well as washed gravel and uncrushed and crushed gravel products. Stockpile capacity is approximately 97,000 cu. yd. of all sizes which represent much more than the average for finished products ready for loading.

The outstanding design feature is the use of belt conveyors exclusively for intraplant transportation. A total

of 2500 ft. of belt conveyor is used. The tonnage per man-hour is probably a new low for the industry since one key man can control all plant operations from a centrally-located point. Push-button controls are used at this location to start and stop all motors. Auxiliary start-stop switches are located at other points throughout the plant for emergency purposes, however. In actual operation, maintenance men, truck drivers, crane operators and loader operators are all required. In all, ten men run the plant. Throughout the plant are many operating details that contribute to lowered maintenance and excellent performance. For examples, baffles in chutes prolong life by causing gravel to ride over gravel rather than wear out steel, hoppers from which belts are fed are designed to reduce impact, trucks are purposely underloaded to minimize wear, etc.

The Barbers Corners plant is a few miles south of Lisle, Ill., a western suburb of Chicago. The new deposit replaces a smaller pit the company worked intensively for many years at another location. The area is the site



ROCK PRODUCTS, October, 1951



Quorry in background showing one of the end-dump trucks on way to plant hopper. Radial stacking conveyor in foreground is building a stockpile of agstone

of an old lake bed and is of glacial drift origin. Gravel was found to make excellent agstone; the calcium carbonate equivalent is 92-97 percent and averages 95 percent. This high calcium content occurs in the gravel sizes and not in the sand size range, which is siliceous, and agricultural limestone is produced as a product of screening and crushing. Many boulders occur throughout the deposit. To utilize these boulders profitably, the company changed its original straight line sand and gravel operation to incorporate what it calls a "chip plant," where the agstone, asphalt aggregate and road stone are produced. This latter stone is in greatest demand and is stockpiled accordingly.

Clay is dispersed throughout the deposit and is easily removed by generous applications of wash water. One foot below the present floor of the pit is the water table, and a layer of clay 11 in. thick lies below this. However, very clean sand and gravel lies in a bed 20-30 ft. thick below the clay, providing a reserve that can later be processed after clay removal.

The deposit covers 200 acres immediately adjacent to the plant. A large area has been stripped of about 112-3 ft. of overburden in advance by a Caterpillar tractor and Carryall. A 112-cu. yd. diesel-powered Marion shovel is now excavating a 30-ft. face. This small capacity shovel can more than supply the plant requirements, being a high speed machine which is operated for maximum efficiency through spotting of trucks to limit the swing to no more than 20 deg.

Stone Sizes and Storage

Ground storage piles are used exclusively at the Barbers Corners plant except where the stacking conveyors may alternately fill adjacent truckloading bins. Sizes produced and the total volume of storage capacity is as

Sizes of sand and gravel produced

Unwashed material

dwasned material
No. 2 stone
Chips, plus ½ in. minus ½ in.
Chips, plus 3/16 in. minus ¼ in.
Minus 3/16 in. screenings or asstone.
Amounts produced vary: total stockpile area
for the four sizes accommodates 30,000 cu.
vd. Road gravel, minus 1 in. to dust-15,000 cu.

No. 11 gravel, minus 7, in. to dust 8000 cu.

Agstone, minus 3/16 in, to dust—8000 cu. yd.

'ashed material'
Sand, minus 3/16 in. -12,000 eu. yd.
No. 8 gravel, plus % in. minus 1 in. 18,000 cu. yd.
Class X gravel, plus % in. minus 1½ in. 5000 cu. yd.
No. 3 gravel, plus ¼ in. minus ½ in. -1000 cu. yd.
u. yd.

cu. yd. o. 4 gravel, plus ¾ in. minus ½ in. 1000

cu. yd.

Birdseye gravel, plus ¼ in. minus 3/16 in.

1000 cu. yd.

No. 5 roofing gravel—1000 cu. yd.

Loading out from stockpiles is accomplished by a Hough Payloader with a 112-cu. yd. scoop. This machine has proved so versatile, maneuverable and fast that the company is considering eliminating all truck loading bins. These bins are easily filled by the radial stackers, but direct loading from stockpiles by rubber-tired loader has the advantage of eliminating freezing up which occurs during the winter months wherever bin gates must be used. The speed of the Payloader is such that it has been possible to load 200 tons into trucks in one hour. It is very maneuverable and it is a simple and speedy matter to quickly respot the loader at the several stockpiles. All shipments are by truck,

Truck Houling

serving a 30-mile radius.

Two Euclid quarry-type end-dump trucks are used for pit hauling. These were chosen in preference to belt conveyors principally for two reasons:



vo quarry-type end-dump



Two settling ponds (center) are a few feet higher than the clear water pend (right) to allow the water to fifter back into the clear pond and he used easin

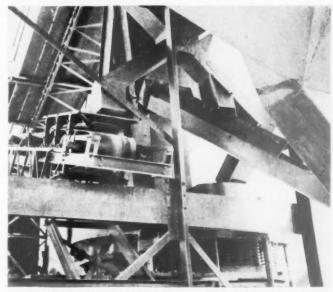
there is too little room in the pit to permit easy moving of a conveyor, and there are wide variations in size distribution throughout the deposit that dictate flexibility and speed in selection. Trucks are able to shift more easily when selective quarrying is practiced.

The two trucks are sufficient to keep the plant supplied to capacity. They travel about a half-mile from the shovel to the hopper over a 3 percent grade. An 18-in. bar grizzly is used over the truck-dumping hopper to reject boulders.

Crushing Plant

A 36-in. x 6-ft. plate feeder underneath the truck hopper feeds a 30-in. x 125-ft. belt conveyor (No. 1) operating at 300 f.p.m. This conveyor, as are all the conveyors in the plant, is of Barber-Greene manufacture. Material is discharged over a 5- x 14-ft., 2½-deck scalping screen. The vibrating screens are all of Telsmith manufacture. The mesh sizes on the scalping screen are never changed. Sizes of the final product are varied by changing the flow of material over secondary screens by means of an ingenious arrangement of flop gates and finger gates.

Oversize from the scalping screen



A system of flop gates under the scalping screen controls material flow to the crushing circuit and the washing plant



Closeup of finger gates on chutes to control percentages of crushed material going to sand and gravel washing plant



Looking down on sand washing tank (right) and twin dewatering screws.

Clay occurs throughout the deposit but is loose and easily washed out
in the overflow well.



Crushing plant as seen from the structure housing the vibrating screen over the agstone steroge bin. Maintenance shop in far background. Truck loading bin at right center is for sand, that at left center for road gravel. Assembly-et rear left is bins, screens and storage piles for various sizes of gravel, including reefing gravel

- SAND AND GRAVEL -



Junction between horizontal (right) and radial stacker conveyors shawing the pivot and wear absorbing baxes

is chuted to the primary crusher, a 16-B Telsmith gyratory, V-belt driven from a 100-hp. General Electric motor. On the way to the primary crusher the oversize passes over a stationary grizzly, all plus 4-in. material continuing on to the primary. Minus 4-in. material passing through the grizzly joins the product from half of the second deck of the scalping screen, the combined flow going to a No. 48 Telsmith Gyrasphere crusher, V-belt driven by a 125-hp. motor. The product from the second half of the scalping screen deck can be chuted to the conveyor delivering to the washing plant, or it can be dropped to an 18-in. x 45-ft. belt conveyor (No. 5) for transport to conveyor No. 1 for return to the crushing circuit. All crushed material (from the three crushers, placed in a row) is carried by a 24-in.

x 72-ft. 6-in. conveyor belt (No. 2) to a 5- x 12-ft. three-deck screen. This screen and its flexible system of draw-chutes is the main control center of the entire operation, serving to divert necessary fractions to the various production points.

Oversize from the top deck can be dropped either on the conveyor delivering to the scalping screen (No. 1) for return to the crushing circuit, or it can go to an 18-in. x 69-ft. conveyor (No. 10) which carries it to a No. 636 Allis-Chalmers Type R reduction crusher. Material from the second deck of the screen can also be chuted to conveyor No. 10, or else to an 18-in. x 126-ft. 6-in. conveyor (No. 11) for transport to the chip plant. Oversize from the third deck can be handled in this same manner. Material passing the third deck is all returned to the scalping screen so it can be sent to the washing plant.

Control of material flow from the three-deck screen just described provides a large part of the whole plant's flexibility. A definite proportion of chips can be fed back into the washing plant circuit to meet specifications calling for certain percentages of crushed gravel. The rest of the chips go to the chip plant. This is accomplished by manipulation of finger gates in conjunction with the conventional flop gates. The finger gates are merely flop gates cut into four to eight segments. Any number can be thrown, one way or the other, to divert only



Front-end loader being used in cleanup work.
The unit is utilized the greater share of the time in loading trucks from ground storage stockpiles

part of the flow to the washing plant. The fingers are shifted into position by rods. The proper number to use in any position has been determined by experiment.

Washing Plant

One of the radial stackers serves a dual purpose; it stockpiles unwashed road gravel, minus 1 in. to dust, and it can feed material into the revolving scrubber in the washing section of the plant. A 200-ton Heltzel steel conical bin between the stockpile area and washing plant is also filled by this 24-in. x 119-ft. conveyor (No. 6). The washing plant consists of a 60-in. x 12-ft. Galland-Henning revolving screen with scrubbing section. This screen is driven by a 10-hp. Louis Allis motor through a Falk All-Motor gear reducer. Water from a 10-in. main is sprayed from a pipe in the



A revolving scrubber is used to advantage in the washing plant



Radial stacking conveyor is here building a stackpile, though it can also fill the track loading bin at right. In practice, the conveyor is ran in one spot for about an hour, then moved 15 ft. to continue the pile



This picture was taken at the time of the official opening of the new plant at Barbers Corners. Left to right are Martin, George, Jr., George, Charles and Robert Hemmerschmidt

center of the washer. Since the clay in the deposit is very fine it is easily washed from the gravel with this unit.

The lower deck of the two deck washing plant tower holds two 4- x 12-ft. three-deck vibrating screens operating wet and in parallel. Conveyor No. 8 is an 18-in. x 204-ft. unit for carrying No. 6 or Class X gravel to their respective stockpiles by means of radial stacker conveyor No. 9, a 24-in. x 119-ft. unit. Material from the lower decks of the screens is carried to the gravel screening plant by means of a fixed conveyor (No. 3), 18-in. x 138-ft. Sand is dropped into a settling tank where the slimes are removed over an overflow weir and flow to a settling pond; the clean sand underflow goes to a 36-in. twin-screw Eagle Iron Works dewatering screw which discharges to the sand stockpile radial stacker belt (No. 4), a 24-in, x 119-ft. unit.

Gravel from the washing plant is further sized by a 4- x 10-ft. three-deck screen in a superstructure over two 100-ton Heltzel conical bins. When these bins are full, the sized gravel can be flumed to individual stockpiles. Four sizes of gravel are produced here.

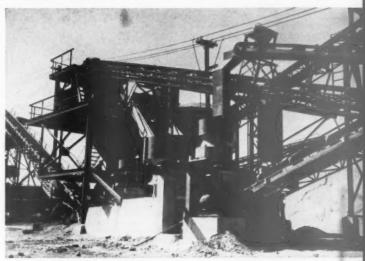
Chip Plant

The many boulders in the deposit forced the building of the chip plant. This plant consists of two triple-deck screens, two bins and two radial stacking conveyors. It has added 100 t.p.h. to the production, making the total output of the plant 350 t.p.h.

A 4- x 12-ft. three-deck screen makes the initial separation in the chip plant. This is over a 200-ton steel bin used for stocking agstone. When the bin is full, a flop gate can divert the fines to an 18-in. x 129-ft. conveyor (No. 15) which delivers to radial stacker belt No. 16, an 18-in. x 81-ft. unit. The same stacker and horizontal conveyor are used for stockpiling No. 11 gravel. This size of gravel can either be sent to its stockpile or, by flop gate, sent over an inclined belt conveyor to the second three-deck screen, located in a superstructure over a 4-compartment bin. This 4- x 12-ft. screen makes the final unwashed gravel separation. Four sizes are normally produced here: No.



The redial stacker conveyors are rotated by means of 15-hp. motors located over one wheel



The three crushers are located over a common collector belt

2, plus % in. minus 1 in.; plus ¼-in. minus ½-in. chips; plus 3/16-in. minus ¼-in. chips; and minus 3/16-in. screenings. Sufficient headroom was allowed above the 4-compartment bin and below the screen to install a classifier if this is found to be necessary to remove agstone fines. Both screens in the chip plant have chains strung lengthwise along the top of the bottom deck to minimize blinding.

Material in the 4-compartment bin is sent to the stockpile area by means of two conveyors, an 18-in. x 210-ft. horizontal and a 24-in. x 119-ft. radial stacker. The latter can rotate through an arc of 287 deg. A total of 30,000 cu. yd. can be stockpiled by this stacker; the sizes of the individual stockpiles can, of course, be varied with the volume of material coming through.

In building stockpiles, the operator generally leaves the stacker at one location for a run of about one hour, then moves it to either side about 10-15 ft. for the next run, to minimize segregation and to permit higher piles to be built. The sides of the cones butting against one another also



A concrete batching plant is being installed at the plant site

help to stabilize the piles. The volume of sand produced is large, so frequently a Koehring 1-cu. yd. clamshell is used to cast the material farther from the discharge of the stacker.

Concrete Batching Plant

A batching plant for loading transit-mixed concrete trucks is located near the stockpile. A 3-compartment Butler bin for coarse aggregates can be filled by one of the radial stackers (No. 9). A 200-ton bin for sand is near the sand stockpile. An auxiliary 50-ton bin for fine blending sand is also used. This sand is high in fines and is trucked in from aeolian deposits in northern Indiana to increase the minus 50- and 100-mesh size fractions. The two sand bins feed into a common bucket elevator for delivery to the weigh batcher. The 200-ton bin has a 20-in. x 5-ft. Telsmith plate



Jake Schramer, plant superintendent of the Barbers Corners plant



This is below the three-deck screen. Conveyor at right delivers material to agatone and chip plant. Bottom conveyor at laft carries material from the plate feeder under the truck hopper to the scalping screen. Top conveyor at left returns material to the crushing circuit



An electromagnetic vibrating feeder accurately regulates the amount of fine sand (minus 50and 100-mesh sizes) which is blanded with the plant-produced sand to meet specifications as called for at the concrete batching plant

feeder, and the 50-ton bin has a Jeffrey vibrating feeder to facilitate flow.

A steel cement tank is provided for storing bulk cement. All batching equipment was manufactured by Butler. The piers supporting the concrete plant bins make use of concrete pipe as forms. The steel members were placed inside these and concrete then placed inside the pipe.

Water Supply

Water is obtained from a deep well pump which draws from a high water table (the DuPage river is nearby). An American Well Works 1800-g.p.m. pump driven by a 75-hp. U. S. Electrical motor has an impeller 10 ft. below the surface of the well. Water is pumped through a 14-in. header against a 100-ft. head. Wash water is returned by a 14-in. pipe line to a settling pond adjacent to the pump pond and is reused after settling out the fines. The former is a few feet higher than the clean water pond, so there is filtering through the sand bank separating the two. When the settling pond silts up, a clamshell is moved

to it to clean it out. It is planned to increase the area of the settling pond since the volume of wash water is relatively large.

A Fairbanks-Morse truck scale is located at the plant. No railroad siding adjoins the plant (the nearest is about 6 miles away); all shipments perforce have to be made by truck.

German Cement

AT THE ANNUAL MEETING of Dyckerhoff Portland Cement Works, Wiesbaden, Germany, it was reported that West German cement production and sales in 1950, as well as in recent months, have shown marked gains. West German cement sales during the first six months of 1951 amounted to 4,470,000 tons, a gain of 27 percent over the 3,530,000 tons sold during the corresponding period of 1950. Sales of the Dyckerhoff plant totaled 718,000 tons for the first six months of this year, compared with 613,000 tons for the same period of 1950.

Alexander von Engleberg, chairman of the board of the Bonn Portland Cement Works, stated that the strong demand for cement which began at the start of the Korean war led to full capacity production. The Bonn plant's 1950 shipments were 296,000 tons, a record in the nearly 100 years of the company's existence, and a gain of 24 percent over 1949. Exports, which totaled 26,000 tons last year, rose at about the same rate.

Mr. Engelberg also stated that, so far, it has been possible to maintain output levels despite the unfavorable coal supply situation. The use of low-grade coal, of fuel oil and of imported coal compensated for the decline in ordinary domestic deliveries. He was doubtful, however, how far this would still be true because of the low coal quotas set for the third quarter of 1951.

U. S. Gypsum Sales

UNITED STATES GYPSUM Co., Chicago, Ill., has reported that its sales of gypsum products during the first half of 1951 were well above those of the first six months of 1950, although the gain the second quarter was below the one-third gain reported for 1951's first quarter. Company officials are less optimistic for the second half of 1951. It is expected that the drop in residential construction from 1950 levels will cut heavily into gypsum sales. Defense housing is not expected to make up the entire loss of home building. Shortages of metal for the company's metal lath and other building products is another factor contributing to the expected drop in sales. Although the first quarter sales were up approximately 33 percent over the same quarter in 1950, the company's earnings were off \$.43 per share. The net equivalent to \$3.49 per share reported for the 1951 period was equal to about 40 percent of pretax earnings.

Lime Producers Inspect New England Plants

Operating Division also holds symposium on drilling, blasting, calcination and difficult production problems

THE PRACTICAL VALUE of holding meetings especially for plant operating men is being demonstrated each year at the annual meetings for the Operating Division of the National Lime Association. Production men are obviously getting a great deal out of the interchange of ideas at these meetings and through the inspection of plants which is arranged for at each of the annual meetings.

The meeting a year ago at State College, Penn., was an outstanding success and reflected in a record-breaking attendance at this year's meeting, held September 10-12 at Heaton Hall, Stockbridge, Mass. Total attendance was about 150 as compared to the previous record of 110, including representation from Germany, England and Canada, and from all parts of the United States including the far West.

This marked the first time that the Operating Division has held a meeting in New England. The traditional hospitality of New Englanders was an attraction but, even more so, was the fact that New England producers have been anything but conservative in their operations. There is no other section of the United States where producers could inspect the Flucsolids kiln in operation, the production of metallic magnesium and calcium from lime and the operation of rotary kilns with stone preheaters,

all within a short distance of the convention hotel.

C. C. Loomis, president, New England Lime Co., Adams, Mass., is chairman of the Operating Division and John V. Andrews, manager of operations, The Kelley Island Lime and Transport Co., Cleveland, Ohio, was program chairman. The arrangements committee comprised Mr. Loomis and J. M. Deely, president, and John Gaisford, both of the Lee Lime Corp., Lee, Mass.

Hermann Lange, president of the German Lime Manufacturers Association was invited by the N.L.A. to attend and address the meeting and was accompanied by P. Flachsenberg, K. Muehlen and Paul Ugowski of Germany. These men, with Mr. Lange, are representatives of the largest lime manufacturing concerns in Germany and, immediately after the sessions, set off to visit a number of American operations in the East and Midwest. Mr. Lange's last visit to the United States was in 1926 and his present trip was scheduled for a month's duration.

N. V. S. Knibbs of England timed a trip through the West and on to Australia with the Massachusetts meeting and arrived in Boston with Mrs. Knibbs the day before the meeting. He, too, planned to visit lime plants on his itinerary to the West Coast.

This year, there were only two sessions at the hotel, with Mr. Loomis and Mr. Deely presiding over the two scheduled sessions, which were both held on the opening day. The first covered Mr. Lange's paper on German lime production methods and one by F. G. Schwalbe, Toledo Engineering Co., Inc., Toledo, Ohio, on "A New Approach to Lime Making," describing a down-draft shaft kiln. The second session covered rotary blast hole drills, blasting and a discussion of the FluoSolids kiln and dryer, concluding with a general discussion of lime burning. A list of questions on lime production problems, both for shaft kilns and rotary kilns, had been compiled and was used to guide the general discussion.

The second day was spent entirely in the field, inspecting the Adams, Mass., high calcium lime plant of New England Lime Co. in the morning and the company's operations at Canaan, Conn., in the afternoon. The special feature of the Adams plant was the FluoSolids kiln and dryer which are now in commercial operation. At Canaan, dolomitic lime is produced and the company is producing metallic magnesium and calcium under government contract.

The third morning was an inspection tour of the Lee Lime Corp. plant at Lee, Mass., which featured the Kennedy-Van Saun rotary kiln and





Left: Here is a study in concentration as officials of the National Lime Association wait for the big bong in blasting demonstration. Left to right are Wallace E. Wing, president, Robert S. Boynton, managing director, and J. V. Andrews, program chairman for the Operating Division. Right: This photograph was taken on plant inspection trip. From left to right are Wallace E. Wing, Bothan L. Corson, Reed C. Bys, Robert Boynton, C. C. Loomis, John Deety and L. John Minnick

preheater in operation and also a blasting demonstration by duPont engineers. Chartered buses and private cars provided the transportation.

Golf and other sport activities were provided at the Stockbridge Golf Club to conclude the meeting on Wednesday afternoon, September 12. The evening before all in attendance were guests at a New England clambake at the golf club through courtesy of the National Lime Association. A special attraction was the attendance of Fritz Kreisler, world-famous violinist and composer, and Mrs. Kreisler, at the clambake. The Kreislers were registered at Heaton Hall and were invited to attend the clambake which they graciously accepted.

Lime in Germany

Chairman Loomis, in calling the first session to order, expressed his pleasure at the unanticipated large attendance which, he said, was the best proof that operating meetings are beneficial. As he expressed it, aggravating production problems are being solved through interchange of ideas and the first-hand study of plant operations in connection with the ses-

Hermann Lange, president of the German Lime Manufacturers Association, is from Hohenlimburg, Germany, where he also is director of Hohenlimburger Kalkwerke. In his opening remarks he expressed thanks to Robert Boynton, general manager of the N.L.A., for Mr. Boynton's part in making the trip to the United States possible, and he was sorry that he was not in position to make direct between production comparisons methods in the two countries.

The lime industry throughout Europe, with the possible exception of Sweden, has developed along different lines than in the United States, he pointed out, because of the low labor costs and high fuel costs of Europe which contrast markedly with the high labor costs and relatively low fuel costs in the United States. The emphasis in Europe and in Germany is in fuel economy and the figures given by Mr. Lange for a typical operation disclosed that a remarkably low percentage of production cost is chargeable to labor.

In Germany, high calcium lime is burned in mixed-feed, high capacity kilns which are fired with coke. Wood is scarce. There are no rotary kilns used for high calcium lime and the only rotaries are used for calcining dolomitic lime.

According to Mr. Lange, a ton of coke costs twice as much as a ton of lump lime and a skilled laborer earns, in 16 hr., the equivalent of the price of a ton of lump lime.

One of the most up-to-date operations in Germany was described in considerable detail. This concern produces 290,000 short tons of high calcium limestone per month and 61,700



Mixed feed shaft kilns like these are typical of operations in Germany, with emphasis on fuel

tons of lime (99+ percent CaO) monthly. Its quarry is the largest limestone operation in Europe.

Working the quarry, which it is assumed is typical, differs in some respects from methods used in the larger quarries in the United States, Sidedump cars are used for overburden disposal and wagons on rails deliver stone to the primary crusher. Dieselpowered excavating equipment is in

Coyote tunneling for blasting is widely practiced and 80 percent of the blasting at this plant is done in that way. In the operation discussed, 30-ft. tunnels are driven into the face and perpendicular lateral tunnels offshoot from the end of the main tunnel. A loading of 0.8 ton of explosive is concentrated at the end of each lateral and the shot is set off by detonators and fuses similar to Primacord. An average shot requires 3.7 oz. of explosive to bring down a short ton of limestone.

Where well drills are used, for 20 percent of the blasting, 3%-in. holes are drilled to a level 5 ft. below the quarry floor, where the face measures 72-75 ft. It is of interest that the holes are drilled at an angle of 80 deg., rather than perpendicular, and, according to Mr. Lange, better breakage results. Holes are spaced 10 ft. apart and split-second delay blasting caps, with one-half second delay intervals, are used. No mention was made of the number of holes fired in a shot, but the explosives requirement is 3 oz. per short ton of stone blasted. Jackhammers do the drilling for secondary

At this quarry, overburden is disposed of in the building of dikes for a settling pond. Shovel buckets are

rated at 4.3 cu. yd. and the cars carry 21 cu. yd. of stone. The cars are hoisted a height of 230 ft. and discharged over grizzlies. Primary reduction is through two 71- x 55-in. jaw crushers and secondary reduction is through a 39- x 22-in. jaw crusher and a gyratory. The stone is screened and there is a washing plant because there is considerable dirt in the stone. Spirals and drags are employed and the tailings are discharged into the

settling pond.

Lime is burned in three types of kilns. Two are Hoffman kilns and the balance are Seeger mixed-feed kilns and gas-fired kilns. The Hoffman kilns each have two fires and a single unit produces 163 short tons of lime per day. They are fired with a mixed fuel consisting of 60 percent high quality bituminous coal, 30 percent lower grade pit coal and 10 percent lignite briquets. Fuel requirement is 5,508,-000 B.t.u. per ton of lime. These kilns require a lot of workers but they perform well on low-grade cheap coal and produce a high-quality, burned lime that is preferred by the chemical industry.

Seeger kilns are charged alternately with layers of coke and limestone. A device was designed which causes the coarse stone to be distributed to the center of the shaft and the smaller sizes to the periphery. Feed consists of 90 percent in the 4-8 in. size range and 10 percent stone from 2% in. to 4 in. size. The coke has a heat value of 11,790 B.t.u. per lb. and is distributed so that the center of the kiln receives most of the coke with very little at the periphery, the purpose being to reduce wear on the refractories while minimizing channeling. Charging is done automatically.

These kilns have a 76-ft. shaft, 13ft. inside diameter and are 132 sq. ft. in cross section. Production is 99 t.p.d. or 0.75 tons per sq. ft. of cross section. Fuel consumption, for a summer month, averaged 3,924,000 B.t.u. which is excellent performance.

Gas-fuel kilns are of elliptical cross section, 60 ft. high and of 75 sq. ft. cross section, producing 77 tons of lime per day or 1.024 tons per sq. ft. of cross section. Fuel consists of lignite briquets of 8460 B.t.u. per ton and fuel consumption is 4,878,000 B.t.u. per ton of lime.

Lime is hydrated in mixers very much like mortar mixers and the time requirement is 11 minutes per charge. Rejects are sold for agricultural use. Mr. Lange said that German producers are much interested in types of hydrating equipment used in the United States and that they are particularly interested in methods used to collect dust.

Belt conveyors are extensively used as are Fuller-Kinyon pumps and valve bagging machines. Principal markets are industrial although some lime is sold for building and agricultural uses. Agriculture lime has a standard



Wherever N.L.A. members got together there was an exchange of ideas. (1) John Moores, The Moores Lime Co., Springfield, Ohlo, right, talking shop with D. M. Kerr, Kaiser Aluminum and Chemical Corp., Salinas, Calif. (2) R. G. Foster, left, and W. D. Jardine, both of The Winnipag Supply and Fuel Co., Winnipag, Canada, were attracted here by something on top of the quory face. (3) A. M. Nieman, The Ohio Hydrate and Supply Co., Woodville, Ohio, left, and D. M. Kerr evidently were talking about something of their than time when this picture was taken. (4) Left to right re W. W. Spraguee, Pittsburgh, Penn., now no longer in the industry, with P. L. Rogers, Kiverton Lime and Store, Va., and Franklin Witmer, I he Ohio Hydrate and Supply Co., Woodville, Ohio. (5) Arthur Hawitt, Warner Co., Philadelphie, Penn., exchanges thoughts with "photographer" Edwin Tanski, Marblehead Lime Co., Chicago, Ill. (6) Things seemed to be looking up for averyone when inspecting quarry operations. Here, on left, are P. L. Rogers, Riverton Lime and Stone Co., Riverton, Yo., with L. N. Carmouche, The Dow Chemical Co., Ludington, Mich. (7) A couple of Vermonters came south for the moeting. Left to right are William H. Pallock and John M. Delglish, both of The Vermont Association Lime Industries, Inc., Burlington, Vt. (8) Irving Warner, Warner Co., Philadelphia, Penn., were his special plant inspection cap. Shown with him is C. Stleistre, The Dow Chemical Co., Ludington, Mich.

price established by the federal government. As to costs given, the breakdown for a ton of lump lime included 4.2 percent for labor, 53.1 percent for fuel, 0.6 percent for electricity and 8.8 percent for repairs and repair labor.

New Shaft Kiln

"A New Approach to Lime Making" was the subject of an illustrated talk by F. G. Schwalbe, president, Toledo Engineering Co., Inc., Toledo, Ohio. This concern is active in the engineering of glass plants and has engineered a concept of a kiln which might be called a "down-draft kiln." In his introduction, Mr. Schwalbe said that the operating economy of a glass melting furnace is vitally affected by the radiation losses from the structure whereas, in the case of a shaft lime kiln, radiation losses constitute a very small portion of the total heat input.

Greatest radiation and convection losses occur in the burning zone of a lime kiln and range from 2 to 3 percent of the total fuel input according to Mr. Schwalbe. These losses approximate 50 to 60 percent of total fuel requirements in the case of a glass manufacturing furnace. Accordingly, he pointed out that an increase in production of a lime kiln can effect only a small reduction, percentage-

wise, in the fuel required per unit of production.

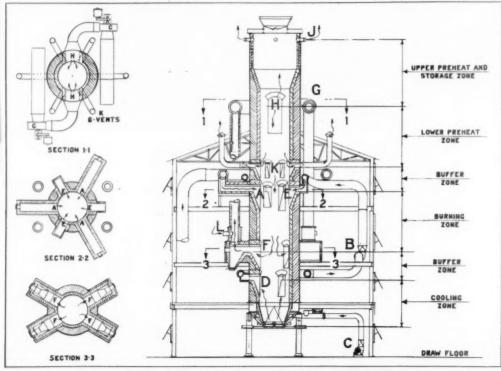
As a result of study of heat balances, it was concluded that any new shaft kiln design must be limited in its ability to conserve fuel and must offer more than fuel economy. A new kiln design, like the one he described, must therefore be flexible, and cause fuel to be burned efficiently and uniformly.

This new kiln was designed on the concept that gases that are being heated should travel upward through the heating mass and that gases that are giving up heat or are cooling should travel downward. Slides were presented to show the movement of gases through heated vertical tubes, which studies were the basis for the design theory.

The fault with conventional shaft lime kilns, he said, is that the hottest passages receive more and more heat which is further aggravated with the use of forced circulation. This condition, which prevails in the burning zone and stone preheating zone, results in channeling of gases and non-uniformity of burning, according to Mr. Schwalbe. Shown below is a vertical section of the proposed kiln which provides for automatic pressures and gas flow. Gases within the kiln are made to travel in ways de-

signed for uniform distribution of heat. Air entering the kiln and being heated by the hot lime in the cooling and buffer zones is being made to flow upwardly while preheated combustion air and fuel gas entering the kiln and imparting heat to the stone is made to travel downwardly through the stone in the burning zone. Waste gases re-entering the kiln travel in two directions. A small part travels upwardly through the stone in the upper preheat zone; balance passes downward through the lower stone preheater.

Operation and control of the various zones of the kiln is interconnected with the desired production rate and the desired temperature for burning. Deviations in fuel input automatically increase or reduce gas flows to maintain the correct kiln balance. In the lime cooling and buffer zones, fan delivers to the bottom of the cooler a volume of air some 40 percent over requirement for theoretical fuel combustion. Preheated combustion air, plus 8 percent excess, is drawn from the top of the cooler through ports "D." Balance of the air flows upward and discharges into the burning zone exhaust ports "F," forming a gaseous seal to prevent recarbonization. Lime is uniformly cooled to 250 deg. F.



Vertical section of kiln, showing how gas flow is controlled for uniform heat exchange





Left: From Germany came (I. to r.) K. Muchlen, Ulm; Hermann Lange, Hohenlimburg; P. Flachsenburg, Wulfreth; and Paul Ugowski, Dernap. Right: Details of a rotary kilin preheater were being inspected when this shot was taken. Irving Warmer is on 16th. In center is L. E. Smith, The Kelley Island Lime and Transport Co., Cleveland, Ohio, and on right is Charles Resey, The Marble Cliff Quarries Co., Columbus, Ohio

As to the burning zone, fuel gas is introduced through ports "A." heated combustion air is withdrawn from the cooler through ports "D" by fan "B" and is returned into the kiln through ports "E." The kiln is at about atmospheric pressure at the level of air and gas introduction. Products of combustion are made to flow downwardly. With this design it is claimed that any tendency toward channeling is overcome by the increased buoyancy created by overheated passages. The gases are made to distribute themselves evenly over the kiln cross-sectional area to establish heat equilibrium and uniformity of product. It is claimed that hot spots at the burning zone perimeter are eliminated. The volume of gases removed through exhaust ports "F" by fans "C," including the products of combustion, CO2 and excess air, is automatically maintained in fixed relation to the fuel input to the kiln. Pressure conditions within the burning zone assist in removing CO2 from the limestone and the downward flow of the gases in the burning zone favors the removal of COn

The method of maintaining the fuel, cooling air and combustion air ratios through instruments was shown by slides.

Mixed gases leaving the burning zone ports "F" are at too high a temperature for a fan so blending air is introduced sufficiently to lower the temperature to about 1400 deg. Burning zone fans "G" return the mixture to the kilns through ports "H" for preheating purposes. About 23 percent of the gases entering the stone preheater through ports "H" are caused to move upwardly maintaining a positive pressure in the upper preheating zone. Adjustable vents 'J" permit the cooled gases and moisture to discharge from the kiln at approximately 300 deg. F. Gases leave the lower preheat zone through vents "K" at a temperature of about 1200 deg. F., these vents being automatically controlled to maintain a slightly



All set for the golf game are (I.to.r.) John M. Deely, Reed C. Bye and Chauncey Loomis

higher pressure in the kiln adjacent to the vents in fixed relationship to the kiln pressure adjacent to fuel ports "A."

Located between the lower stone preheater zone vents "K" and the fuel and combustion air ports "A" and "E" is a buffer zone of preheated stone where pressure conditions create a gaseous seal to prevent fuel gas and combustion air from upward movement. The pressure differential between points "K" and "A" inside the kiln is automatically held to permit a controlled downward movement of part of the preheater zone gases through the buffer zone, insuring the gaseous seal. A slide showed methods of control for kiln pressures. When charging, a pressure differential is automatically maintained in the kiln between vents "K" and ports "A" and "E."

The speaker concluded by presenting a typical heat balance, with an arbitrary capacity chosen for the purpose of presentation. The lime to coal ratio was shown to be 4.32 to 1 and the heat per lb. of lime to be 2748 B.t.u.

Rotary Blast Hole Drills

L. E. Smith, assistant manager of operations, The Kelley Island Lime and Transport Co., Cleveland, Ohio, presented a talk on "Rotary Blast Hole Drills" and gave a breakdown of costs based on his own company's experience with this drill, that indicated excellent results.

Mr. Smith started his talk with a brief history of development of the drill which was first used in the oil fields. Joy Manufacturing Co., manufacturer of the drill, had supplied Mr. Smith with a chronological record of





Laft: Jesse J. Jacobsen (left) and Stephenson Smith (center) of Limestone Products Co., Manaminee, Mich., were attending their first meeting as new members of N.L.A. They are shown here with N. V. S. Knibbs of Longfield, England. Right: Left to right are C. Stielstro, The Dow Chemical Co., Ludington, Mich., and Lester Crown and Wallace E. Wing, Marbleheed Lime Co., Chicago, III.



Chauncey Leomis, left, gives out information to John Andrews, center, and J. H. Robinson, Gypsum, Lime and Alabastine, Canada, Ltd., Teronto

steps in development of the drill.
Originally, the maximum bit pressures were limited and water was first used for removal of the cuttings from the face of the bit and out of the hole.

The tri-cone bit was developed as the answer to the high pressures required for drilling hard, dense rock. Freezing and the problem of availability of water were factors that led to the substitution of compressed air in place of water for the removal of cuttings. The new tri-cone bit with air jets was the final result, for faster drilling speed and under pressures up to 30,000 p.s.i. The compressed air supplied at the bit air cools the bit and eliminates the regrinding of cuttings by quickly removing cuttings from the hole.

Mr. Smith presented drilling data covering some of the principal quarry operations now using the rotary drill, all of which disclosed substantial increases in drilling speeds and improved performance when compared with operation of the drilling equipment displaced.

In one quarry with a medium-soft limestone, drilling speed was 8 ft. per hr. using a churn drill. The footage, using the Medium-Weight Champion (Joy), increased to 24 ft. when circulating water was used to remove cuttings. The footage was increased to 38 ft. per hr. with compressed air. In a second limestone quarry the increase in footage for 6%-in. holes was from 9 to 45-50 ft. per hr. In a third case, a 235-ft. face was drilled (6% in.) in 8 hr. where 8 days was formerly required.

Citing Kelley Island's own experience, Mr. Smith said that the drill is electrically-driven with a 50-hp. motor to operate the revolving table and to remove the drill. A 75-hp. drive is required for a 425 c.f.m. air compressor supplying air at 60 p.s.i. Exhaust is to a Roto-clone dust collector, and hydraulic jacks level the drill. Formerly, three well drills were needed for each of two 5-cu. yd. shovels in operation, and they were replaced with two rotary drills which can more than keep ahead of the shovels when the drills are operated on two shifts.

When drilling in hard limestone, op-



Something on top of quarry ledge ettracted the attention of Carl Morris, Ash Grove Lime and Portland Cement Co., Springfield, Mo., left, and Reed C. Bye, Werner Co., Philadelphia, Penn.

erating costs, for a five month period, totalled 24.83 cents per ft. exclusive of supervision and delivery of supplies. Broken down, the costs (per foot) included 10.7 cents for operating labor, 0.2 cents for grease and oil, 5.1 cents for bits, 0.5 cents for maintenance lubrication, 1.75 cents for maintenance material and 4.5 cents for machine shop. During that period, 57,863 ft. of hole was drilled.

The second drill, in a softer limestone, drilled 58,446 ft. of hole in a five-month period at an average cost of 21.65 cents per hole. Average for both drills was 23.23 cents per ft. of hole. Footage averaged 41.36 ft. per hr. for one drill and 55.5 for the second. Well drills averaged 8.5 per hr. and the cost was 42 cents per ft. of hole. No depreciation was included in the figures but, in recent months, the footage has been increased as delays were eliminated.

In the discussion that developed, the suggestion was made that several small capacity operations could purchase such a drill together to profit from the reduced costs attainable. The top diameter of hole for the heavyweight unit is 73 in. and, for the middle-weight size, the maximum is 614 in. As to bit life, Kelley Island's experience has been that a bit lasts for between 2500 and 3500 ft. of hole. Failures are due to the teeth wearing off first; the bearing would be next as pressures are increased to compensate for bit wear. Bits cannot be sharpened due to loss of metal. Two men are required to operate a rotary

Moving time was reported to be much faster than for well drills and, through use of a spirit level in the cabs, it is simple to level up the drill. Holes are straight and smooth which simplifies loading.

drill.

Blasting

P. K. Alvord, assistant district manager, E. I. du Pont de Nemours & Co., New York, N. Y., discussed modern concepts of blasting and summarized recent developments. Throughout his talk, he gave great emphasis to importance of safety.

Blasting practice has been developed into a real science in recent years, said Mr. Alvord, in accomplishing the main objectives of cost and efficiency. Greatest development has been in drilling patterns. Whereas the old idea was that the spacing of blast holes should be much less than the burden, with great resultant waste in explosives, the modern concept recognizes the desirability for equal side and forward loading which set the stage for short interval delay blasting which has been the greatest single forward step.

Delayed action blasting, with short time intervals, has reduced vibrations from blasting and, he said, resulted in vastly lowered costs. In touching (Continued on base 136)



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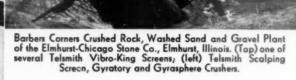
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- BIT RECLAIMER Rock Bit Sales & Service Co. has released a 4-page folder describing the hele-saver, newest tool in tiline. Sectional drawings show design and operation.
- BLOCKS & SHEAVES—American Hoist & Derrick Co. has issued a 24-page catalog, No. 300-24, describing and flustrating its complete line of blocks and sheaves. Information includes block number, capacity in tens, number of rope size and weight of cach black.
- Castings—Pyott Foundry & Machine Co. has issued a folder which describes the company's special size castings, pulleys, flywheels, sheaves and gear blanks. Photographs, diagrams and specifications are shown.
- CENTRAL MIXING—Maxon Construction Co., Inc., Dumperets Division has published a 4-page pamphlet entitled "12 Ways to Set Up for Central Mixing." It is designed to show the economies and increased preduction that can be gained through pre-mixing and delivery of concrete in new-agitating equipment. Twelve different types of central mixing plants are illustrated and briefly described.
- CONCRETE PIPE—Universal Concrete Pipe Co. has published a brechure describing and illustrating engineering specifications for use of Hexseal rubber gaskets with reinforced concrete sewer pipe. Among the subjects covered are type of pipe, dimensions, pipe design and curing compounds and curves. A special section discusses installation instructions.
- CONVEYORS—The Fairfield Engineering Co., Portable Division, has issued Bullatin 450, describing and illustrating four portable conveyors, designed especially for the construction field. Photographs of the conveyors, features of each, and a listing of the company's sales and parts centers are included in the publication.
- TCRUSHERS—Allis-Chalmers Manufacturing Co. has released Bulletin 07B7145B, describing the Hydrocone line of hydraulically adjusted crushers intended for the efficient fine crushing of ore and stone. Operatios, application and specifications of the crushers are covered in the 32-page bulletin.
- 8 CRUSHERS—Sturtsvant Mill Co. has published Bulletin 083, which describes and illustrates its retary fine crushers, said to crush to fine, uniform sizes without a large amount of dust. A table gives complete specifications.
- 9 DIESEL ELECTRIC SETS—Catorpillar Tractor Co. has presented a 16-page becklet, Form 30056, describing and illustrating the company's four largest discel-electric cots, the D387, D388, D375 and D364 engines. Brief fuel consumption specifications are also noted.
- 10 DIESEL ENGINES Nordberg Manufacturing Co. has released a 28-page bulletin, No. 187, describing and filustrating all types of machinery manufactured by the company, including dissel, radial and gasoline marine engines, amine holate, compressors, crushers, acreens and grinding mills. In addition, the historical background of the firm and various industrial applications of the machinery are given.
- 11 DRILLS—Joy Manufacturing Co. has laused Bulletin D-36, describing and illustrating rotary air-blant drilling with the company's blast-hole drills. Complete list of specifications is included.

- DUMP TRUCKS—The Euclid Read Machinery Co. has issued a 16-page catalog folder covering Medels 31TD and 33TD rear-dump Euclids of 44,000-lb. payload capacity. This catalog, Form No. 120, contains specifications data on the complete units, as well as many photographs.
- 18 ELECTRICAL TESTERS—General Electric Co. has released an 8-page illustrated bulletin, CEA-5518, describing loading recisions for testing diesel-electric locomotive power plants. The beeklet outlines uses, ratings, dimensions and operating instructions. A complete description of power connections, loading characteristics, instruments, blower unit and switches is also included.
- FORK TRUCK—Baker-Raulang Co. has released an 8-page specification bulletin, No. 1328, which includes user bonefits of the major components of the FT-60, 6000-lb. capacity fork truck. Dimension drawings and detailed specifications are given.
- FORMS—Symons Clamp & Manufacturing Co. has published its 8-page revised directions booklet, giving details for the erection of wall forms, including panel alignment, stripping, spacing of ties, safe work load for this and pressure per eq. ft. that the forms will stand. Included is illustrated information on accessories.
- 16 HAULING—Whiting Corp. has reloased a bulletin, TM-101, which illustrates and describes new techniques for the materials handling job of spetting, switching or hauling rallway cars. The company's Trackmobile, a jeep-sized plant "locomotive," was designed primarily for hauling rallway cars, but has a variety of potential applications also described in the bulletin.
- 17 HEAVY-MEDIA SEPARATION—American Cyanamid Co., Mineral Dressing Div., has published a technical publication: "Mineral Dressing Notes No. 18" entitled "Heavy-Media Separation Processes for Coal Preparation." Technical data, photographs, flow sheets and diagrams are included in the 36-nace heaklet.

- HIGHWAY SAFETY—Caterpillar Tractor Co. has released a safety bookiet dosigned to focus public attention on the need for better reads. The bulletin, outilited "Step Murder," is a compilation of advertisements that appeared in national magazines in 1946 and 1950.
- 19 HYDRAULIC EQUIPMENT Vickors Inc. has published a catalog, No. M-5100, entitled "Vickors Hydraulics for Mebilis Equipment." Specifications, charts, and deolgn details are given for oil hydraulic power packs, pumps, new series multiple unit valves, steering beasters and motors.
- 20 INSULATION—Johns-Manville has published a 4-page illustrated folder catified "JM-3000 Insulating Fire livick" presenting advantages, applications and refractory properties of this product. Physical and thermal characteristics are given in table form, and summarized information on accessory materials is included in the release.
- MAGNETIC SEPARATORS—Eries Manulacturing Co. has issued a 16-page catalog, No. 18, on "Non-Electric Permanent Magnetic Separators for Tramp iron Removal." Descriptions of separators, pertinaengineering data including photographs, drawings and tubular specifications are given in the catalog.
- MATERIALS HANDLING—Clark Equipment Co. has issued a copy of its magazine "Material Handling News," which makes a report to industry on mechanized materials handling improvements. Among subjects covered are the Dynatork drive, electric battery-powered fork trucks, and hand-pallet trucks.
- Towns Manufacturing Co., Philadelphia Division, has announced the release of a 44-page catalog of materials handling equipment. Subjects covered include general descriptions and application date on gas, electric and hand lift trucks, meterized hand trucks, and hand and electric beliefs.

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- MOTOR GRADERS—Caterpillar Trac-tor Co. has published a 16-page booklet, Form 30158, featuring the history of re-search and engineering, of testing, and of manufacture and inspection behind the "Cat" motor grader. Illustrations are included in the bulletia.
- MOTOR SERVICE.—A. O. Smith Corp., Product Service Division, has issued a bul-letin showing all of the company's motor service stations in the country. Featured are photographs of the production and inapection of electric motors, along with other pictures of its metallurgical, welding and electrical research laboratories.
- POWER DRIVES-Morse Chain Co. has POWER DRIVES—Morse Chain Co. has seleased a catalog, No. C 72-51, on the com-any's Hy-Vo power transmission drives. the bulletin includes a discussion of op-erating principles, design highlights, ca-micities, speed ranges, installation and lu-rication procedures.
- PREVENTIVE MAINTENANCE Cur ins Engine Co. has issued a service bul-tin, "Protective Maintenance Increases otin, "Protective maintenance vofts" describing and illustrating its pro-ram for complete and adequate maintenance or Cummina diesels. This guide book offers formation for a basic maintenance pre-RIS.
- PULVERIZERS & CRUSHERS—The effrey Manufacturing Co. has announced a available Catalog 837, containing 36 ages on swing hammer pulverizers and rushers. Complete apecifications and a apacity table are included in the literature, ilong with photographs of various models of crushers and pulverizers.
- PUMPS-Food Machinery and Chemical PUMPS—Food Machinery and Chemical Corp., Pereleas Pump Division, has released a bulletin, No. B-2300, describing and illustrating the company's horizontal Fluidyne pump line. Two types of pumps are offered in the line. One is a close-coupled electric motor-driven pump, and the other is a bracket-mounted pump for driving through a flexible coupling or V-belt or flat-belt bulley.

- RECORDERS-Wheeles Instruments Co. RECORDERS—Whosleo instruments Co-has announced Bulletin C2-2, describing and illustrating its Capacilog line of electronical-ly operated strip chart recorders. In addi-tion to explaining how direct deflection, Wheatatone bridge circuit and posumatic control types of operating systems are ap-plied to Capacilogs, the catalog includes specifications and a supplementary price list.
- SCALE—The Howe Scale Co. has re-leased a 4-page folder, Form 665, which il-lustrates and describes the company's 77 Weightograph. Twenty features of the automatic weighing accessory are listed along with photographs of the unit.
- SCREENS-Link-Belt Co. has published a book, No. 2354, on Link-Belt "CA" cona book, No. 2309, on Link-bett "CA con-centric action vibrating screens, describing and illustrating service, sixing, operation and function. Detailed dimensions, weights and other engineering layout data are given
- SEPTIC TANKS Carpenter Manufac-turing Co. has released a bulletin describing and illustrating its septic tank forms, dis-tributing box forms, tank handling equip-ment and delivery rigs. Background and his-tory are included, and photographs depicting a variety of equipment are shown.
- SHOVELS & CRANES—Bay City Shov-els, Inc. has published a 20-page catalog on ess, inc. ass puntines a 20-yays catalog on its %-cu. yd. series, crawler mounted shov-el, crane, dragline, clamshell and hoe. Fea-tured are the heavy duty design and con-struction of this convertible machine for atruction of this convertible machine for excavating, erecting and material handling. Machinery assemblies, parts and attack-ments are shown in pictures and described in detail.
- SPEED DRIVES-Reeves Pulley Co. has published a 12-page bulletin, No. G-509, de-scribing and illustrating the basic operating principle of its variable speed drives. It contains representative rating tables and di-mension drawings. The release covers, in condensed form, the variable speed trans-mission varianced materiality varianced mission, vari-speed motordriva, vari-speed motor pulley and a variety of manual and automatic controls for use with them.

- SPEED REDUCERS—Dedge Manufacturing Corp. has released two bulletins designed to simplify selection of a shaftmounted speed reducer. Bulletin A-470 covers the double reduction torque-arm speed reducer series. Bulletin A-602 gives data relating to the single reduction series of
- SPEED REDUCER—The Falk Corp. has issued a 23-page engineering bulletin, No. 1115, describing and illustrating parallel shaft speed reducers with roller bearings for use in a wide variety of industries. Horse-power rating tables, order guide, method of selection, and overhung lead capacities are among the many features included.
- STEAM CURING Shore Engineering has released a bulletin describing and illustrating Shore engineered steam curing systems. The bulletin includes the supply of plans and data for the construction of improved kilns and doors, said to have an important bearing on the quality of the finished block.
- TORQUE CONVERTERS Twin Disc Clutch Co. has published a folder, P.R. No. 19, describing and illustrating the principle of the twin disc torque converter, and vari-ous applications of the converter. The back cover pictures 12 drives, friction or hydraulic, for every requirement-along with a description of each.
- TRACTORS International Harvester Co., Industrial Power Division, has available a folder describing and illustrating crawler tractors in rock products operations. Production and operating costs are
- TRACTOR EQUIPMENT Tracks TRACTOR EQUIPMENT TRACTOR OF TRACTOR OF THE CO. has published a catalog, Form No. 1106, covering the firm's complete line of tractor equipment. Products described and illustrated include Traxcavators, pipe layers, earth augers and awing cranes.
- TRACTOR-TRUCK --- Kalamaroo Manu TRACTOR-TRUCK — Kalamapoe Manu-facturing Co. has announced Bulletin KT-2, describing and illustrating its "Kal-Truk" which is built like a tractor, has 3 speeds forward and reverse, full floating drive axie and an optional dump control on the front
- TRUCKS—Market Forge Co., Materials Handling Division, has released a catalog, No. 1102, describing and illustrating its entire Load-Mobile line. Information on the various units in the line is accompanied various tasts in the its accompanied by action photographs of typical installations, sectional and dimensional drawings and diagrams of turning radii, and a graphic description of the material mechanism of the Load-Mobile.
- VERMICULITE—Zenolite Co. has announced the availability of an illustrated beoklet entitled "Farm Insulation With Double Efficiency." It describes the use of vermicalite products for insulating farm houses and farm buildings.
- VOLTMETERS—The Bristol Co. has anneunced the release of a 28-page bulletin on its line of Series 500 recording voltmeters and ammeters. The bulletin, No. E1111, describes the features of the instruments, with special emphasis on the moving-fron measuring mechanism. Illustrations include photographs and reproductions of charts with actual chart records.
- WELDING—Hobart Brothers Co. has published a 24-page booklet of photographs and articles on welding all over the country. This booklet, No. 3, also gives information on the company's welding acconseries.

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upon the advantages of split-second delay blasting, he said that the greater the number of intervals the less the vibration and the greater the breakage. The vibration effect is greater on soft material. There are dangers from failures when using delayed action blasting that must be especially guarded against. The use of electric blasting caps is, in his opinion, a backward step insofar as safety is concerned.

He said that a safe drilling pattern must be established for an individual operation and cautioned that any deviation from such a tried pattern should be carefully considered. In touching upon the danger of cutoffs, he recommended that excessive current for the caps be available and that the correct resistance wire be used to insure firing. Sloppy wiring practice, in his opinion, is responsible for many unnecessary accidents. On the subject of blasting machines, he said that improvements to the duPont timer limit movement to one revolution so that it is impossible to set off a misfire through a second pass. Among other new developments, he mentioned the recently developed du Pont millisecond connector for delayed action blasting which is a nonelectrical tie for hookup into the trunk line. The non-nitroglycerine explosives were pointed to as the safest.

In conclusion, he recommended the use of Primacord for safety, the selection of a safe drilling pattern, that piles of explosives be sufficiently separated to prevent surface propagation, that supervision be carefully done and that accurate records be kept to evaluate the effectiveness of blasticy.

FluoSolids Kiln

Inasmuch as inspection of the Fluo-Solids kiln of New England Lime Co. at Adams, Mass., for the calcination of high calcium lime was to be the subject of one field trip, Frank S. White, assistant to the president, New England Lime Co., presented a brief explanation of the kiln and its related dryer.

This principle of calcination has been in process of perfection for four years at Adams and a commercial unit is now in full production. The pilot plant and principles of operation were covered in full in ROCK PRODUCTS, January, 1948, pp. 113-116. The process, which is licensed to the Dorr Co. by the Standard Oil Development Co. for many applications, depends upon the fact that finely divided solids may be kept in a fluid state by suspension in air or other gas. While this is taking place calcination of fine particles of limestone is taking place in the application at Adams.

The kiln, or "reactor," is a vertical cylindrical unit into which finelyground, sized materials are fed from above and from which the calcined product is withdrawn continuously from the bottom. The pilot plant had a preheating zone above, followed by the calcining zone just below and the cooling zone at the bottom. The commercial unit now in operation has three successive preheating zones for greater efficiency in heat transfer. The principles of operation were completely discussed in the article to which we have referred and interested readers are referred to that article.

Mr. White had a small model, % into the foot, showing the unit in vertical section and it was agitated through use of a fire extinguisher to show the action of the unit within the several zones. The temperatures in the three successive preheating zones are held at 925 deg. F., 1370 deg. F. and 1560 deg. F. respectively. The calcination temperature is held at about 1860 deg. F. Some calcination takes place in the third preheating zone. Fluidation is accomplished by the rising preheated air.

Firing is done through 12 equally spaced oil burners using bunker C fuel oil. Air is preheated to 675 deg. F. through the cooler. The automatic controls to maintain a fixed heat input and to adjust the rate of feed, etc., were described. Air is introduced through the cooler at the rate of 3400 c.f.m. (3-5 percent excess air) by a Roots-Connersville blower.

Production is 90-94 tons of lime per day with a fuel consumption of 32.7 gal. of bunker C oil per ton of lime. This, incidentally, compares with 61-62 gal. for the rotary kilns in the plant which are of average length, possibly 80-100 ft. At the time of the meeting, some 5 to 15 percent of the feed was minus 100 mesh and work was being completed in the installation of a Dorreo airsizer-a single compartment reactor using the Fluo-Solids principle for sizing-which is expected to remove 80 percent of the minus 100-mesh particles through pretreatment. The goal is to limit size of feed to 5-mesh to 80-mesh particles to reduce the dust loss from 20 percent to an estimated 12 percent. Moisture in the stone has no effect on the efficiency of the system. Lime is burned with a utilization of 4,600,000 net B.t.u. per ton, with exit gases containing 34 percent CO2 and 0.5 to 1.6 per-

The product is fast slaking or can have whatever slaking properties are desired. It is much more uniform than the rotary kiln product. Retention time is varied by altering the depth of bed in the calcining zone, which is ordinarily fixed at 5 ft. Refractories have no abrasive wear on them and are expected to have a life of many years. Direct firing with coal had been tried in the pilot plant with excellent results but the requirement was for 10-15 percent more fuel.

Operating Problems Discussed

As is usual at conventions, there were far too many problems suggested

for discussion to permit them all to be covered adequately, but there was much discussion of some of the more perennial operating problems.

First, problems with respect to shaft kilns were considered. As to instruments, the opinion was that they are used effectively until the burners learn how to operate a given kiln. In answer to a question as to maximum and minimum size stone for natural draft shaft kilns a number of figures were presented ranging from 3 up to 12 in, in size. Main interest was in experiences with burning small stone sizes in shaft kilns but apparently none present were burning stone less than 3 in. in size. Mr. Knibbs of England said that 34 - to 21/2 -in. stone was being burned in mixed feed kilns with 1/2-in. coke.

As to the use of steam under the fire box to produce soft-burned lime, some of the Ohio producers use it and others find it unnecessary. Silica brick seem to be preferred in the firing eye when burning dolomite. These same brick, according to some producers, do not stand up when high calcium lime is produced at high efficiency.

Experiences with clinker ring formation in rotary kilns came in for considerable discussion and there were a number of interesting suggestions. One producer said that the formation of rings was reduced in winter operation by pushing stockpiled stone over recovery tunnels so that the problem of wet stone and grinding it up would not be encountered.

Another producer told of a kiln where the ring would build up over a 60-70 day period, covering 30-50 ft. of kiln length, to the point the kiln drive actually would be overloaded. In other kilns, there would be an abrupt buildup after 15-20 days necessitating the use of a kiln gun.

In another producer's experience, it was discovered that a shift of stone feed size from 1½ in. to ½ in. would result in dropping a ring within two days. Another suggestion was made that kiln stone be screened before being fed into coal-fired kilns, because the fines combine with the coal ash to produce rings. The use of mixed fuels such as gas with coal, and the practice of alternating fuels have helped some producers. Others are experimenting with changing direction of the flame as it impinges on the load.

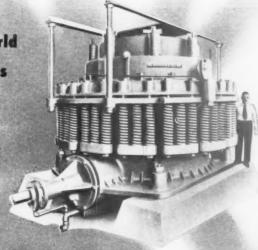
In a discussion of the comparative performance of coal and natural gas as fuels, it was pointed out that gas is less efficient but is often justified on the basis of costs. Mixtures in the range of 25 percent coal to 65 percent gas have proved efficient, with the coal being an additive for the purpose of luminosity. The discussion concluded with comments on the use of dams in rotary kilns. It was believed that dams, when properly placed, would be beneficial because better loads could

(Continued on page 150)

Crushed Limestone and Dolomite

produced throughout the world

with "Symons" Cones



ABOVE: These two 4ft. "SYMONS" Cones crush limestone in a well-known Canadian operation.

RIGHT: Two or nu
"SYMONS" Cone
Crushers used by
large widyester
plant in their dele
mite appropriate.



* LARGE DISCHARGE AREA in the "SYMONS" process of crushing, the wide throw of head creates a large opening for free and rapid discharge of crushed fines. This allows rapid entry of new feed into the cavity... an essential factor for big capacity,

THE outstanding ability of "SYMONS" Cone Crushers to crush greater quantities of stone to finer sizes at lower costs has made them the choice of leading producers of crushed limestone and dolomite throughout the world. In the United States alone, over 200 leading limestone and dolomite producing companies are using "SYMONS" Cones, many of them having several of these Nordberg-built crushers in one location.

The crushing action in the "SYMONS"
Cone is a combination of controlled feed, high speed, timing, and unusually large discharge capacity. These factors—coupled with the spring release safety feature of being able to pass uncrushable material such as tramp iron—are some of the reasons why there are MORE "SYMONS"
Cone Crushers in use for fine reduction crushing than all competitive makes of gyratory reduction crushers COMBINED!

Write for details on a size and type of "SYMONS" Cone to meet your specific crushing requirements.

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Machinery for processing ores and industrial minerals



"SYMONS" Primary Crushers

"SYMONS":
Vibrating











New reinforced concrete perlite mill of Alexite Engineering at Florence, Colo. The penthouse on the roof houses a storage bin from which the ore feeds on to a 5-x 7-ft. screen before passing to the impactor on the second floor. Hopper car is being loaded with ore from a swivel-mounted pipe with an "elephant noise" on the discharge and

Alexite uses hammer-type mill for controlled particle shape and air separator for control of fines

By CLARION W. TAYLOR'

PROCESSING PERLITE ORE FOR EXPANSION

IN THE EARLY DAYS of the perlite industry (3 to 5 years ago), Alexite Engineering Division of Alexander Film Co., pioneered through trial and error various milling devices. At that time, all ore was ground and screened at the mine holdings in Custer county, near Rosita, Colo. To supply the increasing demand for ore, it was decided to build a larger plant at Florence, Colo., close to railroad shipping facilities. This modern perlite plant, built at a cost of approximately \$200,000 and embodying several years of research and experimentation, was completed in the early months of 1951 and is now in operation.

Previous articles have described mining operations at Alexite's extensive holdings near Rosita, Colo. (Rock Products, Feb., 1950, page 94). In general, little has been published on actual mill operations relative to perlite beneficiation.

Break-in operations of the new crushing-screening plant started in September, 1950, but due to changes relative to dust control and installation of a new expanding plant in the same building, consistent quantity production is just getting underway. In preliminary tests to determine correct crushing and sizing of Alexite ore, known as PerAleX, it was found that the desired cubical shape of crushed perlite particles, with elimination of spalls and a minimum of fines, could be obtained from a Pennsylvania impactor.

PerAleX ore, different than softer pumiceous-type ores, is quite abrasive in action on hammers and grinding costs will possibly be found more costly than was originally anticipated.

Each of the several recognized ore types, such as lithoidal, onion-skin

Although Clarion W. Taylor is no longer research director of Alexite Engineering, he has stated emphatically that this article on Alexite's new mill should not be taken as his "sucan song."

On the contrary, all who are familiar with the vast amount of research he has done in the perlite field, know that Mr. Taylor is not likely to stray far from the domain of the "glass rocks." We will be looking for future reports as the result of his continuing study of perlites.

THE EDITORS

and pumiceous, lend themselves to different methods of crushing; as a consequence, extensive tests should be run prior to final installation of crushing equipment. The metal wear and parts replacement costs should be studied carefully in the over-all picture. Various styles of roll, rod and hammermills could conceivably fit particular ores for specific purposes.

Before describing the plant layout in detail it should be pointed out that all dust-producing points are vacuumized. Dust-laden air from the suction pipes goes through a cyclone; the dust drops into a storage bin and the air goes through a suction blower into a 125-ft. stack.

Automatic Operation

The entire plant is designed so that operations are completely mechanized. Several centrally located electric control panels operate the mill by relay switches. The relays are in series and operate in conjunction with stoplock relays on ore gates so that machines cannot be started until everything is clear.

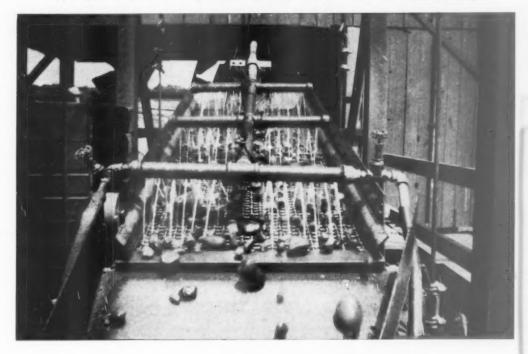
As ore is received from the mine it is dumped from the truck into a 50-ton covered hopper; from the hopper it passes by gravity to a conveyor belt.

(Continued on page 140)

^{*}Former chief chemist-geologist and director of research, Alexite Engineering Division of Alexander Film Co., Colorado Springs, Colo.

"Paid For Itself On One Job!"

Says Syracuse Sand & Gravel Co., Inc. of This Seco Vibrating Screen



More Proof for Top Tonnages and Smooth, Trouble Free Operation...You're Ahead with a SECO

About a year ago, the $3\frac{1}{2}$ deck Seco pictured above was put into operation at the Nedrow, New York plant of the Syracuse Sand and Gravel Company, Inc. It replaced a 4^{\prime} x 20^{\prime} revolving screen. Here is an on-the-job report in the words of Harold Green, plant superintendent.

"Since installing the new screen, our production has increased about onethird and we are also able to produce one more grade of material which is in good demand, and was unobtainable with the revolving screen.

We figure the screen paid for itself on one job, as we were able to meet specification on an abrasive sand that we could not have bid on had we been using the old equipment.

We are very pleased with the screen and to date, other than changing screens, we have not had a wrench on it."

It makes sense to find out how you can make more dollars out of your production, too! Send for Seco catalog No. 203 today!

SECO TRUE CIRCULAR ACTION VIBRATING SCREENS

What's Ahead? Play safe! Enlarge or replace with dependable Seco vibrating screens. A Seco field representative wiil gladly give you the estimates on your requirements. Write:

Screen Equipment Co., Inc.

1750 WALDEN AVE. BUFFALO 25, N. Y.

UNITED STEEL CORP., TORONTO, ONT.

The belt discharges to a large elevator, whence it is elevated to the roofbin and then feeds onto a 5- x 7-ft. Denver Dillon screen having ½-in. mesh.

Material larger than ½ in. passes directly from the Denver Dillon screen to the impactor on the second floor and the minus ½-in. perlite ore goes by gravity to a 1500-ton storage compartment on the first floor, or a portion can be elevator-fed to four 4- x 7-ft., double-deck Leahy screens on the third floor. No dust is produced in the Leahy screen operations as they are totally enclosed and under slight negative pressure. These screens represent a stride forward in perlite screening, hence are discussed in detail.

Perlite Screening

Two of the Leahys have a 16-mesh, square opening, wire cloth upper deck and a 20-mesh bottom deck. Minus 16 to plus 20 material from these screens is gravity piped to a two-compartment storage bin of 200-ton capacity on the second floor.

One of the other Leahys has a 6-mesh upper deck and a 20-mesh bottom, the remaining screen having an 8-mesh upper and a bottom screen of 20-mesh. The minus 6 to plus 20, and the minus 8 to plus 20 sized ore go by gravity pipe directly to their respective compartments in a two-compartment steel storage bin adjoining the minus 16 to plus 20 bin.

While the above standard sizes represent the generally accepted "demand sizes" for perlite ore, plus certain increments of minus sizes (in the 30, 50 and 100 mesh ranges) which can be either added or included in screen set-up operations, the flexibility of the Alexite mill makes it possible to fulfill most of the size demands of furnace operators.

Air Separation

Oversize from all four of the screens is conveyed by gravity through pipe to the impactor. The undersize, or minus 20, from all four screens goes either by pipe or screw conveyor to an air separator. Several ingenious controls make this air separator unusual in many respects. It removes the undesirable dust and permits any desired percentage of minus 100- and minus 50-mesh material to be saved or eliminated. Air separator concentrates go by gravity to one compartment of a two-compartment storage bin. The remaining compartment holds the fines from the air separator and also the dust caught by the cyclone in the dust collecting system. The trend evidenced by perlite expansion plants toward more and more fines in aggregate is readily taken care of by this versatile system.

It should be pointed out that the ore passing through the impactor at the start of the milling process is gravity passed to the 1500-ton storage room previously mentioned or the elevator, thus making a closed circuit. Ore in this large storage room on the lower floor is stacked or pulled by an Ingersoll-Rand electric slusher over the discharge belt.

A long Robins belt conveyor on the first floor runs directly under the three two-compartment storage bins on the second floor. Each compartment of the storage bins has a discharge gate (six gates in all) and each gate feeds directly onto this belt. Thus any desired ore size may be fed from its compartment, or the different gates may be so opened and regulated to achieve any proportion of different mesh sizes.

The conveyor discharges its load on to a second Robins conveyor belt outside the mill building, which in turn conveys the ore to a Link-Belt bucket elevator at the southeast corner of the building. The Link-Belt feeds into a swivel-mounted pipe with an "elephant nose" on the discharge end. Railroad tracks run along side this bucket elevator so that the swivel pipe can be used to fill hopper cars. Box cars are loaded by a Stephens-Adamson car loader. Approximately 1 hr. is required to load a car. Careful analytical tests of each car of ore being shipped make it possible to furnish a laboratory controlled product. Not only is careful attention paid to achieving correctly sized ore, but continuous tests are run on the expansion qualities of the ore.

Perlite ore, as received at the Florence mill from the company's mines near Rosita, is already primary crushed, having been reduced to 1½ in. at the mine. Crushing at the mine is done with a Cedarapids primary jaw crusher. From the crusher, the ore is conveyed by belt to a covered storage bin until hauled by trucks to the new mill.

In addition to the raw ore processing plant, Alexite's Florence mill houses a complete expansion plant incorporating the most modern design and control equipment. This new furnace plant will be discussed in a forthcoming article in ROCK PRODUCTS.

Personnel

The new plant was designed under the general guidance of superintendent Ray Ebeling and engineers Vern Cheever and Jack Green of the Alexite Division.

Actual installation of the machinery was handled by Stearns-Rogers Engineering Co., Denver, Colo., with E. N. Murray in charge.

Tom Matthews, assistant superintendent of Alexite, is now in charge of the Florence mill operations; Robert Wilfley is chief field geologist and in charge of research. J. Don Alexander is president of the company and Ernest Dillon is sales manager.

Gypsum Production

GYPSUM AND GYPSUM PRODUCTS were produced at record rates during the first quarter of 1951, according to a Bureau of Mines report. Domestic mine output of 2,102,006 short tons was 28 percent higher than in the same quarter in 1950, in which the previous high record was established. With a 48 percent gain in imported gypsum, total supply amounted to 2,-715,499 short tons.

Calcined gypsum production was 1950 figure. Portland-cement retarder output was 23 percent higher than in 1950, and 18 percent above the previous first-quarter record of 1949. Tonnage of base-coat plaster was 11 percent than in 1950, and 17 percent more board was manufactured than in the same period in 1950. There was also a marked gain in the production of agricultural gypsum.

Accident Prevention Program

NATIONAL CRUSHED STONE ASSOCIA-TION has issued its first monthly accident report for member companies. The Monthly Accident Review is a part of the association's new accident prevention program. The accident prevention committee has expressed great satisfaction with the response received for the first month. Fifty-four plants, representing 39 companies, reported for the month of May, 1951. Of the 54 plants, 45 had accident-free records. There were 11 lost-time injuries reported, but none of which were fatal or resulted in permanent inturies.

In the report, each accident is listed, without company identification, followed by comments on the causes of the accidents and suggestions as to how the accidents could have been prevented, or how to prevent similar accidents in the future.

It is a very worthwhile project and the association expects to accomplish a considerable reduction in the number of accidents among its members, through the reporting and dissemination of these reports. Members are urged to mail in the reporting forms, giving as much information as possible. The Monthly Accident Review is edited by C. A. Gustafson, chairman of the N.C.S.A. Accident Prevention Committee.

Stone Company Merger

Canada Crushed & Cut Stone Ltd. has been formed through the merger of four companies—Canada Crushed Stone Ltd., Queenston Quarries Ltd., National Cut Stone Ltd. and Ritchie Cut Stone Ltd. Public offering of securities of the new company is expected in the near future through Harrison & Co.

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Easy on-Easy off

TAPER-LOCK bushing grips the shaft for the full length of the bushing - holds sheave with firmness of a shrunk-on fit. No wobble. Taper-Lock runs true!

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Finest grade of close-grained semisteel, cast in the Dodge foundry.

The grooves, machined on precision equipment, have identical pitch diameters. This insures equal belt tension. Every belt pulls its share of the load!

TAPER-LOCK sheaves are available from distributors' stocks in complete range of sizes in A, B, C and D grooves.

DODGE SEALED-LIFE BELTS have special protection for tension members, insuring longer belt life. Perfectly matched to TAPER-LOCK sheaves.

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HIGH TEMPERATURE OIL WELL CEMENT

Tests of product made by Cementos Portland del Bajio, Mexico

By CARROLL B. CORE®

Table 1. Physical tests on freshly ground ce-

D UE TO EXPANSION of the Mexican petroleum industry there has been an increasing demand for high temperature oil well cement to be used in the deep wells near Tampico and Veracruz, Mexico. Cementos Portland del Bajio, S. A., was the first company in Mexico to produce oil well cement. It compares favorably with that made in the United States and is now used exclusively by the Mexican petroleum industry. High temperature oil well cement has been manufactured by a number of cement plants in the United States for many years.

The Mexican cement not only meets the requirements of temperature and pressure, but also has a low viscosity when mixed in a 40 percent cement slurry containing about 16 lb. of cement per gal. of water. This viscosity is maintained for 6 to 8 hours. Once the cement is placed, it gains rapidly in strength and forms a hard dense impervious seal which is necessary in any oil well cementing operation.

The dry process is used in the cement's manufacture. The clinker is burned in two kilns, one 150 ft. x 10 ft. x 8 ft. 6 in. and one 150 x 9 ft. The mills used in grinding are open circuit 5-ft. diameter mills in tandem.

Rigid control is maintained from the time the specially selected rock leaves the quarry until the finished product has been shipped. Table I shows the results of physical tests. The tensile and compressive strengths as well as setting time tests were made on a slurry with a 40 water-ccment ratio and cured in a water bath at 150 deg. F.



Thickening Time and Rate of Hardening

An important test used by plants which manufacture oil well cement is the thickening time test. It gives an indication of the time that a cement

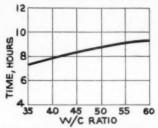


Fig. 2: Thickening time for slurries with various water percentages, at 180 deg. F.

slurry will remain pumpable when being placed in a well. Cementos Portland del Bajio determines this by a set of three Halliburton consistometers. This appartus is constructed so as to measure the torque necessary to move the blades of a paddle through a mass of slurry at a predetermined temperature. This plant operates the instruments at 180 deg. F. since this is a more severe temperature than is normally found in cementing operations. Each apparatus has two containers for the slurry so that two tests can be made with a single machine. The instruments are calibrated into poises with 100 poises as the limit. Cement slurry is placed in the container and agitated by the paddles; stiffness is indicated by the increase of poises. The maximum that a slurry will remain pumpable is 100

The consistometer also shows pumpability characteristics of the cement slurry. The time involved to reach 100 poises is not the only consideration;

it also is important to know how the limit is obtained. A slurry which begins to stiffen shortly after it is placed in the consistometer and then gradually increases to 100 poises is not satisfactory in the field since it would not only require high pump pressure, but in the event of mechanical shut down, the slurry would gradually stiffen and it may not be possible to move it when operations start

Fig. 1 shows the stiffening time for a 40 percent water-cement ratio high temperature oil well cement. A very fluid state of 10 poises is maintained for 8 hr. When stiffness commences, the tangent to the curve becomes practically vertical up to the limit of 100 poises. This feature is indicative of the rapidity with which a cement will develop strength after initial set.

Care should be taken to add only sufficient water to insure pumpability for placement in the field, with allowance for any reasonable shut down period. It is necessary to prevent the formation of sediment and at the same time have a strong dense homogeneous mass of set slurry after it is placed in the well. The addition of excess water would undoubtedly increase the pumpable time, but this advantage would be offset by lower strengths of set slurry, less density and the formation of sediment.

Fig. 2 shows consistometer readings using various percentages of water. With 35 percent the initial reading was 30 poises. All the other percentages had an initial reading of 10 poises or less. In each case the initial

(Continued on page 152)

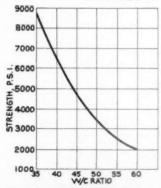


Fig. 3: Compressive strengths at 24 hr. for sturries with different water percentages. Specimens cured at 150 dag. F.

Chief chemist, Cementos Portland del Bajio, S. A., Leon, Gto, Mexico.

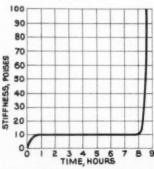
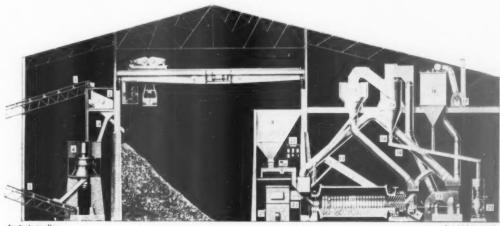


Fig. 1: Stiffening time of slurry using 40 percent water-cement ratio. Test made at 180 deg. F.

KENNEDY STRATIFIED AIR SWEPT TUBE MILL SYSTEM*

with Dual Classification

for raw stone, ore and clinker grinding lowers grinding costs...reduces power consumption...cuts maintenance costs



Finished Material

- 1 Belt conveyor feed to crusher
- 2 Vibrating screen 3 Oversize return chute
- 4 Gearless gyratery crusher
- 5 Belt conveyor closing crusher circuit
- 6 Traveling crane
- 7 Clamshell bucket
- 8 Mill feed hopper

- 9 Weighing feeder
- 10 Stratified air swept tube mill
- 11 Cross conveyor for eversize
- 12 Return conveyor for oversize
- 13 Radial flow classifier
- 14 Cyclone collector
- 15 Mill exhauster 16 Dust filter

- 17 Dust filter exhauster
- 18 Rotary air locks
- 19 Finished material conveyor
- 20 Automatic pnoumatic transport pump
- 21 Hot air furnace
- 22 Instrument and control cubicle
- 23 Automatically controlled tempering air damper

The Kennedy Stratified Air Swept Tube Mill System produces 94% plus through 325 mesh when grinding clinker 2" and finer. It dries and grinds simultaneously and air-cools cement while grinding clinker.

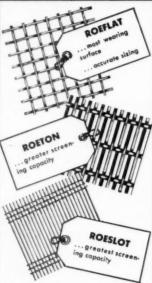
In our test plant, when grinding to $92\,\%$ through 200 mesh, 25 tests showed an increase in the capacity of the Tube Mill by the use of Dual Classification of from 29% to 52%.

The Kennedy Stratified Air Swept Tube Mill not

only grinds raw material having up to 20% moisture, but becomes a combined dryer, grinding mill and separator, thereby serving a three-fold purpose.

Marked economy of operation sets the Kennedy mill apart. By comparison, the savings effected in power consumption, wear-and-tear and man-hours, more than pay the initial installation cost within a ten-year or shorter period. Send for blue-prints and operating data. They show why users say "It Costs Less To Own The Best."

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Labor Relations Trends

Continued from page 79)

and recurrent participation in interstate commerce are covered by the Act regardless of the amount of time spent in such activity.

"(5) Employes who regularly and recurrently devote a portion of their time to activities in interstate commerce, within the meaning of the Fair Labor Standards Act, are within the coverage of that Act for each week during which they are so engaged, and the amount or percentage of time devoted to such activities in interstate commerce by such employes has no significance in determining coverage under the Act.

"(6) The defendants have repeatedly violated Sections 6, 7, 11(e) and 15 of the Fair Labor Standards Act from April 1, 1950, until the time this cause came on for trial.

"(7) Under Section 17 of the Fair Labor Standards Act of 1938, as amended, a permanent injunction should issue to prohibit further violations of Sections 15(a) (2) and 15(a) (5) thereof.

"Let judgment be entered accordingly.'

Status of Foremen

The other case of special interest to all rock products producers and ready-mixed concrete manufacturers is that of the Ready-Mix Concrete Co., Ltd., of Honolulu, H. I. Here the decision was made on May 11, 1951, by the U. S. Department of Labor, Public Contracts Division, which has supervision of enforcement of the Walsh-Healey Public Contracts Act. A number of interesting questions arose as to just what employes came under the Act and would have been entitled to overtime pay, except for the statute of limitation in the Portalto-Portal Act. The employes under investigation included not only those at the batching plants, but those engaged in producing crushed stone and sand aggregates.

The quarry foreman was held to be covered by the Act, even though classified by the employer as a superintendent, because he spent as much as two hours a day working drills himself, and on some occasions also set powder charges. Foremen employed at the concrete plants who did no manual work, other than occasionally to give a hand to employes under their supervision, were held exempt from the Act. The foreman in complete charge of the night shift at the concrete plant, whose duties included hiring and firing and recommending employes for promotions, was exempt from the Act. The batch plant operators (scale men) were held to be subject to the Act. It was held that "although the occasional performance of manual duties as an incident to purely supervisory duties does not bring foremen within the coverage of the Act, the manual tasks performed by

the batch plant operators were more than such incidental duties.'

It should be stated here that the alleged violations of the Act occurred during the war, between June, 1941, and January, 1945. Action by the Federal Government did not begin until April, 1948. The statute of limitations established in the Portal-to-Portal Act of 1947, the Labor Department held, did not apply to a Government action to recover liquidated damages under the Walsh-Healey Act. It did prevent the employes from attempting suits for recovery of any unpaid wages alleged to be due. The Government's estimate of liquidated damages was \$22,060.57. Much of the work involved was for the military and on verbal orders. The Labor Department examiner held that this made no difference, even if compliance with the Walsh-Healey Act was not specifically mentioned. The Act applies, the examiner said, to all government contracts for indeterminate amounts, notwithstanding the stationary limitation of \$10,000, since the coverage has been construed as extending to all contracts the sum of which may exceed \$10,000. The employer's contention that some of the orders were filled from stockpile, accumulated while not filling government orders, did not hold because the stockpiles were never sufficient to fill the orders without replenishment after the receipt of the government orders.

The only employes exempted from the Act were the repair and maintenance men, who were specifically named exempt under Rulings and Interpretations No. 2 issued by the Secretary of Labor in 1939.

In numerous instances former hourly-rate employes were subsequently put on monthly salaries, and were paid substantial bonuses in addition. This, however, did not alter their status, according to the examiner's ruling, and in several instances these employes were alleged to have worked as much as 60 hours a week without the overtime payments required by the Act. The government did not depend wholly on the testimony of the employes involved. Some of them did not wish to appear against their employer. But their cases were included based on time records, so far as obtainable, of those who worked with them.

Obviously, there are many points of extreme interest to all producers of aggregates and ready-mixed concrete who do business with the Federal Government. On the fact of the decision it would appear that this producer is being penalized five years after fulfilling his contracts in a military emergency, during which both he and his employes worked overtime from patriotic motives.

Changes Name

TEMPLE GRAVEL Co., Waco, Texas. by an amendment to its charter of incorporation, has changed its name to Little River Gravel Co.



SILAS MASON bought 1,280 feet of Pioneer Conveyors for the Fort Randall Dam Project. Conveyors unlaad 275 tons of aggregate an hour from railroad cars and build stockpiles. A Pioneer tunnel conveyor feeds the batch plant.



MITTRY BROTHERS used the following Pioneer equipment on the big Mulah Dam Project: an Apron Feeder, Jaw Crusher, Vibrating Screens, Triple Roll Crusher, Dehydrator, Bucket Elevator, Revolving Scruber, Storage Bins and over 1,100 Feet of Conveyors.

Solve your conveyor problems for 3¢

Now, at last, with the help of a remarkable 52-page handbook, you can solve your conveyor problems as well as most experts. This handbook tells how wide, how long your conveyor belt should be. It shows correct angle of incline, spacing of idlers, motor horsepower required.

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UNIVERSAL: VIBRATING SCREEN CO

Ft. Randall Requirements

(Continued from page 99)

plant as well as the other one at Ft. Randall is served by the Milwaukee railroad.

McCarthy Improvement Co. has a C. S. Johnson & Co. batch plant and two 4-cu. yd. Koehring mixers with a nominal capacity of 120 cu. yd. per



Intake gate control section of Ft. Randall dom consists of 12 reinforced concrete towers

hour. A Hightower forced air cooling system for the coarse aggregate is provided, supplemented by a 30-ton Vilter flake ice unit. Two 3000-bbl. cement silos for bulk cement are used.

At the points of manufacture of the coarse and fine aggregates the Corps of Engineers has adequate testing laboratories, and materials are accepted, or rejected, at point of shipment. However, segregation and breakage or spalling is watched for at the point of use.

Ft. Randall dam is a Corps of Engineers project under the direction of George O. Evans, area engineer; C. B. Stokes is executive assistant. Both of these men were connected with the construction of Fort Peck dam. C. R. Brown is chief of the construction division, with T. J. Reading, concrete technologist. Leonard Strutz is chief of the laboratory.

Blending Sand to Meet Army Specifications

(Continued from page 101)

flat running screw conveyor. The discharge product of the rod mill joins the fines from the Hum-mer in the twin dewatering screws mentioned above.

The larger rod mill gets its feed at both ends from the flat running screw conveyor through openings in its bottom and the rod mill discharges to the previously mentioned twin dewatering screws. The rod mill discharge has around 17 percent minus 100-mesh material in it and about 5 percent minus 200 mesh. The plant produces about 150 tons of sand per hour of which an estimated 25 percent is manufactured.

The rod mills were purchased sec-

ond-hand and were overhauled with a new set of liners almost at the outset of operations. These sets of liners had operated 2½ seasons up to the time of the plant's inspection and have now been replaced. Rods are 3-in. diameter, low carbon steel. It was extimated that rod wear was about 0.8 lb. per ton ground.

In referring to the flow diagram it will be seen that the flat running screw conveyor can also unload all, or any part, of its load direct to the off-bearing sand belt and thence to storage. Constant screen testing of the various products and of the final sand is a necessity at the plant, and at all plants producing to this specification.

The sand is excavated from a pit near the river by a Model 6, Northwest dragline that has a 2-cu. yd. bucket. Six by six International trucks do the primary hauling and these unload to a pit hopper under which is a company-made reciprocating feeder. It feeds a belt conveyor serving the Simplicity vibrating screen previously mentioned in connection with the sand recovery system. The screen has a top deck of 7/16-in, and 11/2-in, wire; the middle deck is 1/2- x 3/16-in. wire. Oversize from the screen is chuted to a 9- x 36-in. Diamond jaw crusher and the throughs returned to the first mentioned belt conveyor in closed circuit. All material plus No. 4 mesh and passing 11/2 in. falls to a belt and is conveyed a short distance to a 4- x 12-ft., three-deck, Stephens-Adamson vibrating screen mounted over a 25-cu. yd. steel truck hopper. This screen does the final screening of the gravel.

Wash water and fines from the plant flow to a settling pond where fines can be reclaimed by clamshells and if necessary all or a part of this material, after draining, can be returned to the plant.

Storage

Sand from the plant falls to ground storage and is east back to piles close to the railroad where the material is allowed to drain and is shipped after sampling. A Northwest crane with an Owens clamshell bucket does the intermediate storage handling and some of the final loading. A Trackson front-end loader is available for miscellaneous truck loadings. Shipments are over the Milwaukee railroad. The haul from Hawarden to Ft. Randall is about 150 miles; the freight on sand to Ft. Randall is \$1.87 per ton.

Hallett Construction Co. has three other important affiliates, United Construction Co., Becker County Sand and Gravel Co. and Central States Construction Co. The four organizations have 12 gravel plants in Minnesota, five in Iowa, two in North Carolina, three in South Carolina, where they also furnish material for the H-bomb plant, and one in Ohio. E. W. Hallett is president of Hallett Construction Co. and R. N. McGiffert, chief engineer. Head office is in Crosby, Minn.

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Crushing Quartzite

(Continued from page 104)

Tailing Pond

The rejects from the washing plant, or tailings, will be impounded in a pond to be built on the back rim of the quarry using techniques similar to those used in some of the western metal mines and which have been described in recent issues of ROCK PRODUCTS. By installing a tailing pond of this type, the operators expect to eliminate any problems relating to stream pollution.

J. P. Everist, Sioux Falls, S. D., is head of the aggregate production section for L. G. Everist, Inc. Besides being a large producer of aggregate, the company is well known in contracting circles; the contracting business is conducted from the Sioux City, Iowa, office. T. S. Everist is in the engineering section and takes an active part in the Dell Rapids construction work. Hal Ascherin is plant superintendent, Russell Martin is in charge of safety and personnel for both the Hawarden and Dell Rapids plants, and R. C. Alfred, production manager.

Control of Tailings

(Continued from page 113)

ing back" effect of the water is lost, the two factors combining to flatten out the impounded material during which time some of the sand is flushed close enough to the berm to be made available for the tractor. When slimes start flowing over the weir the closure is made and the area can, if so desired, be rebuilt and the slushing repeated. When the pond in use has built up to the desired point the clear water is drawn off as completely as possible and the area allowed to dry out.

When a tractor is used to build up the berm, a thorough compaction of the berm or dike is essential under this system, for any pin-size hole would cause leakage that could quickly result in loss of the dike.

There are now roughly 63,000,000 tons of rejects in the three ponds. The height of the dike around the total area varies from a few feet up to 30 or more feet, but compared to some of the previously discussed dikes, the heights are relatively shallow.

This type of control in a wet and humid climate would be of doubtful value as it would be difficult to build up a dike with a wet or sloppy material, and a dike built by a dragline is not as compacted as when a tractor and dozer is used—particularly when a small tractor is used, because the greater number of trips over the berm with the tractor's pads, the better the compaction.

R. W. Thomas is general manager of the Ray Mines Division, Kennecott Copper Corp., W. I. Garms is assistant general manager, and F. J. Tuck is mill superintendent.



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Users know Hewitt-Robins Belting gives long, low-cost servicemoves more tonnage for less. They know it wards off the punishing pull of bucket bolts . . . abrasion caused by lumps caught between boot pulley and belt . . . wear from belt slippage . . . deteriorating effects of mildew-every other abuse of dayto-day service.

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Lime Producers Meet

Continued from page 1361

be attained and better heat transfer. Experience so far is limited.

The field trips to the plants of New England Lime Co. took an entire day. Both the quarries, one high calcium and the other dolomitic, were inspected as was all the processing of stone and the manufacture of lime. As already stated, the FluoSolids installation at Adams, Mass., was emphasized. At Canaan, Conn., the group was privileged to observe manufacture of magnesium from lime by the Pidgeon process.

The concluding trip was an inspection of the Lee Lime Corp. lime plant at Lee, Mass., where the main attraction was the Kennedy-Van Saun rotary kiln with preheater installation. The kiln is a 712- x 125-ft, unit equipped with both preheater and deheater. The preheater is fed sized stone from an overhead bin and the waste heat is effective in elevating the temperature to the 900-1000 deg. F. temperature range upon entry into the kiln. Output was not given but performance figures were posted that showed high efficiency was being obtained. The lime to coal ratio is 5:1 and the heat consumption is 5,558,000 B.t.u. per ton of lime. Exit gas temperature is 400 deg. F. and dust losses 1.2 percent. The concluding feature was a blasting demonstration conducted in the quarry by du Pont engineers. A 3hole well drill shot (6 in.) was put off with a charge of 3519 lb. of Nitramon and Nitramex to bring down 12,-000 tons of stone. The holes were spaced 18 x 21 ft., were 100 ft. deep, and millisecond delay caps were used. The breakage was excellent.

Registration®

Alan R. Allen, Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y. P. K. Alvord, E. I. du Pont de Nemours & Co., Inc., New York, N. Y. J. Y. Andrews, The Kelley Island Lime & Tuansport Co., Cleveland, Ohio. Tuansport Co., Cleveland, Chio. Conah., New England Lime Co., Canaan,

Conn. . J. Barrett, New England Lime Co., Canaan,

Conn. L. Bliven, U. S. Gypsum Co., Farnams,

Con.

Con.

Con.

L. Bilven, U. S. Gypsum Co., Farnams, Mass.

Robert S. Boynton, National Lime Assn., Washington, D. C.

W. Bowen, The Marble Cliff Quarries Co., Reed C. Bre, Warner Co., Philadelphia, Penn. L. N. Carmouche, The Dow Chemical Co., Ludington, Mich.

Alan B. Cheney, Cheney Lime & Cement Co., Birmingham, Ala.

George L. Clezie, The Kellev Island Lime & Transport Co., Cleveland, Ohio, Peter Comalli, Lee Lime Corp., Lee, Mass.

Bolton L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.

Philm L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.

Lester Crown, Marblehead Lime Co., Chicago, Ill.

III.

John M. Dalglish, The Vermont Assn. Lime Industries, Inc., Burlington, Vt.
Clifton Danforth, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.
D. W. Davies, St. Regis Paper Co., Toledo.

b. W. Davies, St. Regis Paper Co., Toledo. Ohio.
Ohio.
Ohio.
Ohio.
Lee Y. Lee Lime Corp., Lee Mass.
Ohi M. Deely, Jr., Lee Lime Corp., Lee, Mass.
V. T. Elekelberg, E. I. du Pont de Nemours &
Co. Brookline, Mass.
Flachsenberg, Rheinische Kalksteinwerke,
Wulfrath, Germany.
Unifrath, Germany.
Wilniper, Canada.

*About 50 non-registrants also attended.

John Gaisford, Lee Lime Corp., Lee, Mass. C. B. Geiger, The Marble Cliff Quarries Co., Columbus, Obio. D. J. George, U. S. Gypsum Co., Farnams, Mass., Joseph A. Groden, International Paper Co., Boston, Mass., Harold E. Gustafson, National Gypsum Co., Bellefonte, Penn. L. Hammond, Keystone Lime Works, Inc., Keystone, Ala.
Donald C. Hamme, National Gypsum Co., Donald C. Hamme, National Gypsum Co., Bellefonte, Penn. H. S. Hangen, St. Regis Paper Co., New York, N. Y. A. C. Hewitt, Warner Co., Bellefonte, Penn. W. J. Hockridge, U. S. Gypsum Co., Farnams, A. C. Hewitt, Warner Co., Bellefonte, Fenn. W. J. Hockridge, U. S. Gypsum Co., Farnams, Mass.

Julius L. Howath, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.

J. E. Jackson, Marbichead Lime Co., Thornson, Inc., Plymouth Meeting, Penn.

J. E. Jackson, Marbichead Lime Co., Thornson, D. C.

Kent Jander, National Lime Assn., Washington, D. C.

W. D. Jardine, The Winnipeg Supply & Fuel Co., Winnipeg, Canada, Charles J. Johnson, New England Lime Co., Canan, Com.

Con, Salinas, Calif.

N. V. S. Knibbs, Longfield, England.

R. I. LaMarche, International Paper Co., New York, N. Y.

Hermann Lange, Hohenlimburg Kalkwerke, Hohenlimburg, Germany.

J. C. Leonard, The Marble Cliff Quarries Co., Lewiburg, Ohio.

G. Hongopold, St. Regis Paper Co., Allentown, Pencopold, St. Regis Paper Co., Allentown, Richard H. Lepley, The Kelley Island Lime & Richard H. Lepley, The R

Penn, Richard H. Lepley, The Kelley Island Lime & Transport Co., Columbus, Ohio, C. C. Loomis, New England Lime Co., Adams, MacLaren, The Dow Chemical Co., Free-D. MacLaren, The Dow Chember, port, Texas.
Gladys L. McBee, National Lime Assn., Washington, D. C.
John J. McInnis, Eagle Rock Lime Co., Eagle Rock, Va.
Gilbert E. Mason, The Kelley Island Lime & Transport Co., Columbus, Ohio.
F. M. Merritt, Toledo Eng. Co., Inc., Toledo, Ohio.

Ohio.
L. John Minnick, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.
John Moores, The Moores Lime Co., Spring-field, Ohio.
Carl Morris, Ash Grove Lime & Portland Cement Co., Springfield, Mo., Al Moser, Lee Lime Corp., Lee, Mass.
K. Muehlen, Ulmer Weisskalkwerke, Ulm, Ger-

K. Muenien, Uline.

Many.

Herman Naventi, Lee Lime Corp., Lee, Mass.

John Naventi, Jr., Lee Lime Corp., Lee, Mass.

A. H. Nieman, The Ohio Hydrate & Supply

Co., Woodville, Ohio.

Lee H. Niems, Marbiehead Lime Co., Chicago,

Lee H. Niems, Marbiehead Lime Co., Unicago, III.
Bror Nordberg, Rock Paoducts, Chicago, III.
A. E. Pavlish, The Kelley Island Lime &
Transport Co., Cleveland, Ohio.
H. Transport Co., Cleveland, Ohio.
Transport Co., Cleveland, Ohio.
R. J. Pierson, New England Lime Co., Adams,
Mass.
William H. Pollock, The Vermont Assn. Lime
Industries, Inc., Burlington, Vt.
Charles Rarey, The Marble Cliff Quarries
Co., Columbus, Ohio.
M. A. Rikard, Southern Cement Co., Birming-ham, Ala.

Co., Columbus, Obio.

M. A. Rikard, Southern Cement Co., Birmingham, Ala.

M. A. Roberson, The Kelley Island Lime William A. Roberson, The Kelley Island Lime William A. Roberson, Gypsum, Lime & Alabastine, Canada, Ltd., Toronto, Canada.

P. L. Rogers, Riverton Lime & Stone Co., Riverton, Va.,

F. G. Schwalbe, Toledo Eng. Co., Inc., Toledo, Ohio.

W. E. Scott. International Paper Co., New York, N. Y.

Maurice Shafer, Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.

N. D. Shafer, The Kelley Island Lime & Transport Co., Marblebead, Ohio.

John W. Smith, Warner Co., Bellefonte, Penn.

L. E. Smith, The Kelley Island Lime & Transport Co., Cleveland, Ohio.

M. W. Smith, U. S. Gypsum Co., Falls Village,

M. W. Smith, U. S. Gypsum Co., Falls Village,

M. W. Smith, U. S. Gypsum Co., Falls Village,

W. Smith, U. S. Gypsum Co., Falls Village, Conn

Conn.
Willard G. Smith, Gypaum, Lime & Alabastine, Canada, Ltd., Toronto, Canada.
W. W. Sprague, Pittaburgh, Penn.
C. Stelstra, The Dow Chemical Co., Ludington, Mich.
C. P. Svehla, U. S. Gypaum Co., Farnams,
Mass.

Edwin Tanski, Marblehead Lime Co., Chicago, Walter E. Trauffer, Pit and Quarry, Chicago, Ill.

Stephenson Smith, Limestone Producta Co., Menominee, Mich, Paul Ugowski, Rhein Westf. Kalkwerke, Dor-nap, Germany.





CONTINUOUS OPERATION



That's right ... it took 21 years daily punishment to wear out the

original Deister Screen in the plant of the Steiner Sand and Gravel plant near West Milton, Ohio. That's why the Steiners, Walter J., and son, Richard, chose another Deister.

The Steiner plant utilizes two sizing screens-both Deisters-in this 650 tons per day capacity plant. Screens have to be good, to produce

uniform results, because aggregate processed comes from three separate Deister 3-deck screen was bought in since 1929. Their 4 x 10 4-deck Deister Screen was purchased in 1944 to replace one of another make that had been giving excessive bearing trouble.

Deister screens have long life and they give screen cloth long life. They belong in your plant. Get the facts from your Deister dealer-or write direct to the factory.

sources and varies widely. The 3 x 6 1950 to replace a similar Deister which had been in continuous use

same and no retrogression has occurred. Table II. Results after 6 months storage in standard cement paper bags Setting time (40 percent slurry at 150 deg. F.) Initial Final

Alfred Viola, New England Lime Co., Canaan, mn. Warner, Warner Co., Bellefonte, Penn. ug Warner, Warner Co., Philadelphia

Penn.
Joel H. Watkins, Charlotte Ct. House, Va.
Frank S. White, New England Lime Co.,
Adams, Jass.
Adams, Jass.
Adams, Jass.
J

Wallace E. Wing, Marblehead Lime Co., Chi-cago, Ill. illace E. Wink, manuscassing, ago, Ill.
anklin Witmer, The Ohio Hydrate & Supply
Co., Woodville, Ohio.
d D. Witmer, Jr., The Ohio Hydrate &
Jupply Co., Woodville, Ohio,
race L. Woodland, Warner Co., Cedar Holwe Penn,

(Continued from page 142) poises were maintained through most of the test. When stiffening commenced, the tangent to the curve became practically vertical to 100 poises. In Fig. 3 the same water-cement ratios as shown in Fig. 2 were used. Slurry was poured into 2- x 2-in. cube molds and cured in a water bath adjusted to 150 deg. F. At the end of 24 hr., the hardened cubes were taken

out of the molds and broken for compressive strength. Fig. 3 shows that even with a water-cement ratio of 50 fairly good strengths were obtained. No sedimentation was observed in the slurry from 35 to 50 percent inclusive.

Samples of the first high temperature oil well cement manufactured at this plant were also tested by Halliburton Research and Testing Laboratories, Duncan, Okla., in a Stanolind high pressure thickening tester. The temperature and pressure imposed

upon the slurry in the simulated casing job showed the cement to be satisfactory for use in oil wells with a bot-

tom hole condition of 14,000 ft. and a

Stability

ture oil well cement from the silo and

stored on the packing house floor. Periodic tests were made to determine

the stability of the product. Table II

shows the results after 6 months storage. When compared with the fresh

cement shown in Table I it will be

noted that results are practically the

Several standard cement paper bags were filled with high tempera-

pressure of 13,386 p.s.i.

Oil Well Cement

Final 5 hr. 58 min.
Compressive strength (40 percent slurry cured at 150 deg. F.)
24 hr. 8 days 7 days 8080 p.s.i. 7 days
Consistemeter time (40 percent slurry at 180 deg. F.)
10 poises up to 7 hr.
Stiffening commenced at 7 hr. 5 min.
Limit of 100 poises reached at 7 hr. 45 min.

Changes Address

LONE STAR CEMENT CORP., New York, N. Y., has announced the removal of its Kansas division offices to 1005 Grand Avenue, Kansas City,

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

ROCK PRODUCTS, October, 1951

Agricultural Limestone

NATIONAL AGRICULTURAL LIMESTONE Association recently announced that the consumption of agricultural limestone in 1950 was the second highest tonnage used during a calendar year in the history of the country. According to an extensive survey, 29,198,830 tons of agricultural liming material were used in 1950. The highest consumption was in 1947, when 30,282,-902 tons were applied to farm lands. Fifteen years ago, the use of agricultural limestone had never exceeded 3,000,000 tons a year. The Agricultural Conservation Program was inaugurated by Congress in 1936 and has been primarily responsible for the increase.

The highest consumers, by state, in 1950, were: Illinois, 4,985,397 tons; Iowa, 3,502,516; Missouri, 3,101,463; Indiana, 2,856,342; Ohio, 2,204,173; and Wisconsin 2,075,626.

Cement Plant for Turkey

ECONOMIC COOPERATION ADMINISTRATION has approved a credit of approximately \$1,982,000 to buy machinery and equipment for a new cement plant to be established at Zimir, Turkey. As a part of the Marshall Plan aid to private enterprise, the credit stems from the release by E.C.A. of certain funds deposited by the Turkish government to match American aid in dollars, to promote speedier economic development by helping privately-owned industries in Turkey.

Nonmetallics in Israel

A METALLURGICAL ENGINEER of the U. S. Bureau of Mines, George M. Potter, is conducting a preliminary survey in Israel to determine the feasibility of mineral resources development projects. Mr. Potter, the first Department of Interior expert to go to Israel under the Point Four program, will study several minerals projects, including research on bituminous limestone, development of the potash industry and the establishment of an ore-dressing laboratory. The work is being financed jointly by the Technical Cooperation Administration, the Department of State and the Government of Israel.

California Talc Report

THE CALIFORNIA STATE Division of Mines has announced the publication of Special Report No. 8, entitled "Talc Deposits of Steatite Grade, Inyo County, Calif.," written by Ben M. Page who visited 32 talc mines and prospects in the state during the course of his investigation, undertaken by the U. S. Geological Survey in cooperation with the California Division of Mines. Detailed description of 17 of these mines is included in the report, as well as geologic maps of some of them. The report may be obtained from the California Division of Mines, Ferry Building, San Francisco 11, Calif., for \$.85.

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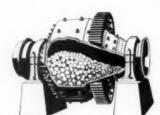
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. CONICAL MILLS

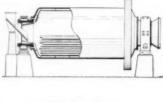
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the only device of its kind that controls the feed rate in grinding milts by listening to the sound of the rotating load. It compensates for changes in hardness, size of feed, etc.—producing a more uniform oversize, increasing mill capacity 10 to 20%, and freeing the operator for other duties. Ask for bulletin 42.7.

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Secondary Boycott Decisions

CHARLES A. HORSKY, counsel for the National Sand and Gravel Association and the National Ready Mixed Concrete Association, has prepared a memorandum on recent Supreme Court cases concerning secondary boycott decisions.

One of the major reforms which the Taft-Hartley Act was supposed to accomplish when it was passed in 1947 was the control of secondary boycotts. However, the memorandum explains, since "secondary boycott" is a term which can be defined in a number of different ways, and since there are a large number of borderline cases no matter how it is defined, the courts have issued a variety of decisions on the exact extent of the Taft-Hartley Act prohibition. Last June, to help clarify the act, the Supreme Court delivered four opinions which help in defining just how far the act goes.

As explained in the memorandum, the issue in each case revolves around the proper construction of Section 8 (b) (4) (A). That section makes it an unfair labor practice for a labor organization or its agents

"(4) to engage in, or to induce or encourage the employes of any employer to engage in, a strike or a concerted refusal in the course of their employment, to use, manufacture, process, transport, or otherwise handle or work on any goods, articles, materials, or commodities or to perform any services, where an object thereof is:

"(A) forcing or requiring any employer or self-employed person to join any labor or employer organization, or any employer or other person to cease using, selling, handling, transporting, or otherwise dealing in the products of any other producer, processor, or manufacturer, or to cease doing business with any other person."

The first case cited involved the construction of a commercial building in Denver, Colo. The general contractor awarded the electrical work to a sub-contractor who employed nonunion men. All the other workers were members of unions, all of which were affiliated with the Denver Building and Construction Trades Council. The council put a picket on the job, stating that it was "unfair" and notified each union affiliate of the council's decision. The Supreme Court decided that this notice was a signal in the nature of an order to the union members to leave the job and remain away until otherwise ordered. The council and the unions told the general contractor that the trouble was the subcontractor's non-union men. About three weeks later, the general contractor gave in, excluded the non-union men, and the union men returned to work.

The Supreme Court held that this was an unfair labor practice barred by Section 8 (b) (4) (A), quoted above; that it was the object of the council to force the termination of

the sub-contractor's contract. This is distinguished by the court from the situation where a single employer hires both union and non-union men, where no boycott would be involved if the union refused to work with nonunion employes. Several other contentions of the council were also rejected by the Supreme Court. The court held that it did not matter that both the general contractor and subcontractor were employed on the same project, since the latter was an "independent contractor" and entitled to be treated as such. The court also held that the matter was within the jurisdiction of the National Labor Relations Board, because the sub-contractor's business was to a substantial extent run on material purchased outside of Colorado. In addition the court held that the council got no immunity for its action from Section 8 (c)-the "free speech" section. The court stated that this section "does not apply to a mere signal by a labor organization to its members, or to the members of its affiliates, to engage in an unfair labor practice." (See "Labor Relations Trends," ROCK PRODUCTS, August, 1951, page 95.)

The second and third cases were similar to the Denver case. One sub-contractor employed non-union electricians and the other, non-union carpenters. In both cases the jobs were picketed. The court again held that unfair labor practices had been com-

mitted by the unions.

The fourth case was different. It concerned a rice-milling company. The union did not represent the employes at the company, but was trying to organize them and had a picket line. One afternoon a customer sent a truck to the mill to obtain some rice. The pickets told the truck driver that there was a strike on and that he would have to go back. He returned to the main highway where he met an officer of the mill, and by a short detour, they both returned to the mill, being stoned by pickets as they did so. The court held that this was not a violation of Section 8 (b) (4). As the court put it: "A union's inducements or encouragements reaching individual employes of neutral employers only as they happen to approach the picketed place of business generally are not aimed at concerted, as distinguished from individual, conduct by such employes. Generally, therefore, such actions do not come within the proscription of Section 8 (b) (4), and they do not here.

That the union had been guilty of violence, as well as persuasion, the court held to be immaterial—that the means by which the union acts does not control whether Section 8 (b)(4) has been violated.

Rock Crusher Contract

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has received a defense contract for approximately \$5,000,000 covering rock crushing machinery.



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Savings in equipment cost, time, labor and maintenance are four big reasons for using Sauerman Scraper and Cableway machines for all your long range material handling work.

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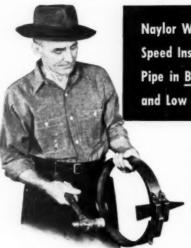
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Naylor Wedge-Lock Couplings Speed Installation of Naylor Pipe in <u>Both</u> Heavy-Duty and Low Pressure Service

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These positive type couplings are available in two types—for heavy duty and for low pressure. They provide the quickest, easiest and most economical method of pipe assembly, and a hammer is the only-tool required.

The Naylor Wedge-Lock one-piece construction offers definite advantages. Joints can be made up with only one side of the line in the open. The coupling also provides for expansion and contraction. It assures tight, leakfree joints, less power loss, long service life, high salvage and re-use value. Available in sizes for light-weight pipe from 8" to 30" in diameter.

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Asphalt-Cement Controversy

THE OKLAHOMA TURNPIKE AUTHOR-ITY recently voted to delay action on contracts for 9.978 miles of grading and drainage in Lincoln county, due to disagreements on base thickness specifications, according to a recent report in the Oklahoman. The action was taken after the attorney for the governor and a representative for the portland cement industry objected to the 12-in. base specified by engineers. It was contended that a base of this thickness would not be needed if concrete surfacing were selected, and that, by providing such a base in the grading contract, asphalt interests would be favored.

The actual specifications called for 16 in, of subbase but 4 in, would have been cut off to provide center fills and shoulders when the surfacing was placed. It was contended that an 8-in. base would be sufficient for concrete surfacing, that the authority should provide for only 12 in. of grade materials, which would leave 4 in. for center fills and shoulders, and that the additional base would be a waste of money. The governor advised holding up the awards until engineers could prepare designs and specifications for surfacing to be considered at the same time the grading and drainage contract is awarded. He added, "I want to be sure there is competition in bidding between asphalt and ce-

Waterproof Road Surface Dressing

THE ROAD RESEARCH LABORATORY in England has announced the discovery of a surface dressing in road building that is waterproof, insuring that freshly laid surface dressing will not be damaged because of rain. It was found that if the stone chips, for application over a tarred surface, were treated with a creosote containing a wetting agent, that this treatment enables the stone to stick to the tar immediately and water cannot later break this bond. Of the materials tried, a solution of creosote and cetyl pyridinium bromide was the most successful. The stone can be coated in a roadside concrete mixer or at a quarry. It is also possible to spray the solution on top of the tar film before the stone chips are applied, although it was stated that this method was not quite as effective.

Installs Lime Kilns

Dominion Lime Ltd., Lime Ridge, Quebec, has completed installation of three new Azbe kilns. These three kilns, plus five wood-fired kilns, have an annual capacity of approximately 52,000 tons. Two additional Azbe kilns for burning small stone are also being installed and will be in operation soon. This will boost annual capacity to 85,000 tons. The five wood-fired kilns are kept in operation to provide sulfurfree lime for several steel companies.

Cement Production

ACCORDING TO FIGURES released by the National Production Authority, the cement industry has stepped up production 13 percent above the 1950 rate. During the first five months of 1951, 93,452,000 bbl. of cement were produced, compared with 80,693,000 bbl. in the corresponding period of 1950. N.P.A. further stated that although the availability of structural steel may seriously affect cement consumption, industry members believe that cement shipments will be equally as high in 1951 as they were in 1950.

Vermont Talc

THE GEOLOGICAL SURVEY recently released a report on diamond-drill exploration of two large Vermont talc deposits, the Rosseau prospect, Cambridge, Vt., and the Barnes Hill prospect, Waterbury, Vt. The exploration program was carried out under the general supervision of A. H. Chidester, field geologist, as part of the program of the Geological Survey's

Vermont talc project.

Nearly all the talc ore at the Rosseau prospect was reported to be of good quality and said to be exceptionally white for talc derived from ultramafic igneous rock. As stated in the report, the talc is suitable without beneficiation for many intermediate grades of talc product, and flotation concentration would probably yield a product suitable for most industrial uses other than industrial steatite. The talc ore at the Barnes Hill prospect was reported to be of intermediate to fairly good color, to be suitable with beneficiation for many industrial uses and also amenable to flotation concentration.

Copies of the report, accompanied by large scale maps, have been placed in open file for public inspection at the offices of the Survey, Room 1033 (Library), General Services Building, Washington, D. C.; at 64 Main St., Montpelier, Vt.; and at the office of the Vermont Geological Survey, University of Vermont, Burlington.

Sales Promotion

AGRICULTURAL LIMESTONE INSTI-TUTE has announced the availability to its membership of a booklet containing a new series of newspaper ads which treats the subject of soil liming simply and forcefully and from a wide variety of angles. Each of the 18 mats included is a complete ad, requiring only the addition of the company name and address.

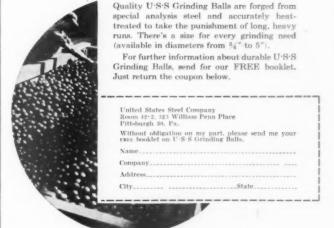
Kansas Molding Sands

THE KANSAS STATE GEOLOGICAL SURVEY is conducting a study of molding sands in various Kansas counties. The objective is to find satisfactory Kansas sands that can be utilized by the state's foundries. Part of this study will be coordinated with an investigation of Kansas river sands for marketable feldspar.

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Jerseyville, Ill.

Large Agstone Plant

MELVIN STONE Co., Wilmington Ohio, recently completed its remodeling and expansion program and has resumed full operations for the production of agricultural limestone. Plans for the new plant were made last year in order to take care of the increased demands by farmers of that area. Capacity of the new plant is about 600 tons of agricultural limestone per day. The plant is also equipped to produce limestone sand. Other facilities include a 200- x 40-ft. storage building.

Opens Vermiculite Plants

ZONOLITE Co., Chicago, Ill., recently opened three vermiculite processing plants, located in Trenton, N. J.; Birmingham, Ala.; and Tampa, Fla. The Tampa and Birmingham units will be operated by Southern Zonolite Co., a subsidiary. The plants were established to provide better service and to reduce shipping costs. There are 33 Zonolite owned and licensed plants in the United States and Canada.

Gravel Firm Wins Suit

HIGHLAND SAND & GRAVEL Co., Dedham, Mass., was awarded a \$62,-761.87 judgment in a suit against the town of Dedham for the taking of land in the Fairbanks Park area in 1948 for cemetery purposes. That amount paid by the town, by order of a court decree, includes interest charges. On December 15, 1950, the court ruled the town must pay the company the sum of \$60,255.53. In October, 1950, a jury awarded the plaintiff the same sum of money. Both sides appealed the jury decision, the plaintiff on the grounds that the sum was insufficient, and the town on the grounds that the verdict was excessive. The gravel company charged that the town had seized 42 acres of its land for which it offered only

New Developments in Wage Stabilization

THE WAGE STABILIZATION BOARD recently adopted a resolution to establish a 3-member "National Enforcement Commission" which will be responsible for taking such enforcement actions as may be necessary or desirable in order to secure compliance with wage stabilization regulations and to prevent or penalize illegal wage payments by employers.

The board's resolution also provides that where any wage, salary or other compensation payments violate wage stabilization regulations, all agencies and departments of government shall, upon certification by the board, disregard and disallow the entire amount of such payment (not merely the amount representing the illegal overpayment) for the following purposes:

1. In calculating deductions under U. S. tax laws;

2. In determining costs or expenses

under U. S. contracts;

3. In satisfying or approving any maximum price ceilings for the purpose of any other law or regulation;

4. In determining costs or expenses of the employer for the purpose of any other law or regulation.

In addition, the Board may recommend to other federal departments that such departments withhold priorities assistance and the allocation of materials from employers who make illegal wage payments.

By agreement between the Wage Stabilization Board and the Wage-Hour Division of the Department of Labor, inspectors from regional wagehour offices will investigate violations of wage stabilization rules.

Mexican Cement Production

MEXICAN PRODUCTION of cement increased to 1,290,000 metric tons in 1950, or 177,000 tons more than in In 1942 production was only 560,000 metric tons. It reached 998,000 in 1947 and 1,080,000 in 1948.

Calcium Carbonate

IT WAS RECENTLY REPORTED in Limeographs (National Lime Association) that a new patent on the manufacture of precipitated calcium carbonate has been issued to Schur and Levy, Brevard, N. C., and assigned to Ecusta Paper Corp. This process is designed to produce calcium carbonate of two to four microns size from finer CaCO, particles through a coarsening procedure, without application of heat or control of temperature

Defluorinated Phosphate

INTERNATIONAL MINERALS and Chemical Corp., Chicago, Ill., has announced plans to build a new plant near Mulberry, Fla., for the produc-tion of defluorinated phosphate, and also, to recover uranium as a by-product. The plant will be adjacent to the company's phosphate mining property and is expected to cost approximately \$10,000,000. Plant capacity will be about 100,000 tons of defluorinated phosphate per year.

Buys Gravel Company

PAINT VALLEY SAND AND GRAVEL Co., Paint Valley, Ohio, a new corporation, has purchased Klyne Gravel Co., also of Paint Valley, from Paul S. Klyne. The new owners, Roy F. Rice, Clyde E. Wilson and Herman Williams, plan to enlarge the opera-tions of the plant by the addition of new machinery.

Limestone Plant

GEORGE M. BAKER Co., which has operated a limestone plant near Lockwood, Ohio, has established a portable plant at Chesapeake, Ohio, for processing a deposit of magnesium limestone recently discovered in that locality.

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Extra strength and safety - only type of clip where entire clip, including bolts, is drop-forged.

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FINANCIAL

GENERAL PORTLAND CEMENT Co., Chicago, Ill., has reported the following earnings for the three months to March 31:

	1951	†1950
Net sales 8	6,723,100	\$5,833,800
Costs & expenses	4,032,500	3,369,200
Operating profit	2,690,600	2,464,600
Other income, net	25,700	8,400
	2,716,300	2,468,000
Federal income tax	1,271,000	1,032,000
Excess profits tax	283,000	
Net profit	1,162,300	1,486,000
Earn., com. share	81.12	\$1.38
No. of com. shares		1,039,971
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PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reported a net profit of \$347,786 for the first quarter of 1951, compared with a net profit of \$294,804 for the corresponding period of 1950. For the 1951 period, earnings per common share were \$.48 on 643,720 shares, and for preferred shares, \$11.22 on 31,000 shares. Earnings per common share for the 1950 period were \$.80 on 321,860 shares, and for preferred shares, \$9.51 on 31,000 shares.

PEERLESS CEMENT CORP., Detroit, Mich., for the first three months ending March 31, 1951, has listed a net profit of \$152,898, of \$.49 per common share on 310,062 shares. This compares with a net profit of \$38,561 for the same period in 1950.

THE KELLEY ISLAND LIME AND TRANSFORT Co., Cleveland, Ohio, lists a net profit of \$1,155,698, or \$3.74 per share on 308,952 shares, for the 12 months ended March 31, 1951. This compares with a net profit of \$798,457, or \$2.58 per share for the 12 months ended March 31, 1950. Net sales for the 1951 period were \$11,408,587, as against \$8,940,465 for the previous year.

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., listed a net income of \$462,830 for the three months ended March 31, 1951, compared with \$117,911 for the same period in 1950. Earnings per common share for the 1951 period were \$.77 on 602,136 shares, and \$.20 per share for the 1950 period. Net sales totaled \$4,676,068 for the first three months in 1951, as against \$3,127,424 for the same period in 1950.

UNITED STATES GYPSUM Co., Chicago, Ill., has reported the below account of income for the three months ended March 31:

	1951	1950
Net sales	\$48,239,107	\$36,662,286
Net before taxes	14,506,526	10,668,188
Income taxes	8,779,000	4,408,006
Net profit	5,727,526	6,260,188
Earn, preferred share	\$73.22	\$80.03
No. of preferred shares	79.999	78 999

GIANT PORTLAND CEMENT Co., Philadelphia, Penn., reported a net profit of \$827,538 for the year ended March 31, 1951, as against a net profit of \$480,797 for the preceding year. Earnings per common share for the 1951 period were \$.77 on 1,067,079 shares, and \$.56 per share on \$54,007 shares for 1950. Net sales amounted to \$5,509,878 for the 1951 period, compared with \$4,619,756 for 1950.

NEW INCORPORATIONS

Neenah-Menasha Sand and Gravel, Inc., Neenah, Wis., has been in-corporated with 1000 shares of stock, par value, \$100. Minimum capital was listed at \$25,000. John W., James A. and George (Jr.) Schultz are the incorporators.

Love Hollow Limestone Co., Limedale, Ark., was recently incorporated by W. H. Jewell, J. O. Coley and E. G. McWilliams with authorized capi-

tal listed at \$300. Universal Materials Corp., Canton, Ohio, has been granted articles of incorporation for producing and processing quartz, sand and gravel and other materials. Glenn W. Vogelgesang, Delma Dontas and Rose Grubish were listed as incorporators.

The capital consists of 250 shares of no par common stock.

Trumbull Portable Concrete Co., Niles, Ohio, was recently granted incorporation papers with permission to issue 250 shares of no par common stock. The incorporators are Fred, John and Frank Comparato.

Lancaster Sand & Gravel, Inc., Lancaster, N. Y., was recently incorporated with a capital of 120 shares of stock. The incorporators are Paul M., Fidelis H. and Joseph Pfohl and Jerome H. Raynor.

Verona Redi-Mix Co., Verona, Wis., was recently incorporated with 500 shares of stock, no par value. Minimum capital was listed at \$500. The company will deal in ready-mixed concrete, sand and gravel. P. W. Palmer, Esther and Olive Palmer are the incorporators.

Valley Sand & Gravel Co., Waukesha, Wis., was recently incorporated. Capital stock was listed as 100 shares, no par value, to 133 shares,

no par value.

Gila Valley Concrete Co., Safford, Ariz., was recently granted articles of incorporation. Delbert Hart is the

incorporator.

Sand, Inc., Wichita, Kan., with a listed total capital stock of \$25,000, has been granted a charter of incorporation and will deal in gravel and building materials. Clarence Webb was designated as resident agent.

Self-O-Line Concrete Products, Inc., Kent, Ohio, was recently incorporated by Hugh A. and Braden P. Brown.

Concrete Haulers, Inc., Dallas, Texas, has been issued a charter with capital stock listed at \$12,000. Thomas L. Amis and Eugene M. Locke are the incorporators.

Moore Sand and Gravel Co., Lake City, S. C., has been incorporated with \$5000 capital stock. Rogers Nettles is president of the new company.

West Suburban Transit Mix, Inc., Naperville, Ill., was recently incorporated with 10,000 shares of common stock, par value \$10. The incorporators are Franklin H. Newkirk, Florence Richards and Walter O. Herschhach.



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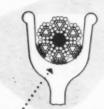


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MANUFACTURERS NEWS

Hercules Powder Co., Wilmington, Del., has announced the appointment of J. Joseph Kelleher as an assistant director of sales of the explosives department. He was formerly assistant sales manager.

The Thew Shovel Co., Lorain, Ohio, announces that M. B. Garber, director of sales, has been appointed director of the construction machinery division of the National Production Authority, Washington, D. C., of which he had been a consultant for the past six months. Mr. Garber was head of the construction machinery division of the W.P.B. during World War II.

Fuller Co., Catasauqua, Penn., an-nounces that P. M. Klein, sales engineer in the Chicago district office, has been appointed district manager of that office. He succeeds C. C. Kaesemeyer who has been recalled to Catasauqua, Penn., as sales manager.

Pioneer Engineering Works, Inc., Minneapolis, Minn., has announced the appointment of A. J. Belanger as assistant sales manager.

Bemis Bro. Bag Co., St. Louis, Mo., announces that J. E. Monaghan has been appointed employe training consultant. He will plan and conduct training and information programs to aid employes in efficient performance of duties and in gaining a fuller knowledge of the history and policies of the company.

Fruehauf Trailer Co., Detroit, Mich., has announced the organization of a new company, Fruehauf Trailer S. A., Industria e Comercio, with headquarters in Sao Paulo, Brazil, to assemble and manufacture trailers and trailer bodies for South American trade. Dr. Ary F. Torres has been elected director-president, and L. C. Burnett is managing director.

Thermoid Co., Trenton, N. J., announces that its Canadian subsidiary. Joseph Stokes Rubber Co., Ltd., has sold substantially all of its assets to the General Tire & Rubber Co., Ltd., of Canada.

A. O. Smith Corp., Milwaukee, Wis., has announced the appointment of John B. Madden as hydraulic sales manager for the North Central district.

Prat-Daniel Corp., South Norwalk, Conn., manufacturer of stacks, dust collectors, induced draft fans, etc., has completed removal of its plant and offices to South Norwalk, Conn., from East Port Chester, Conn., where it had been located for the past 17 vears.

The Allen-Sherman-Hoff Co., Philadelphia, Penn., manufacturer of Hydroseal pumps, has moved its home office to a new, modern building at 259 E. Lancaster Ave., Wynnewood, Penn., just a few miles west of Philadelphia.

American Tractor Corp., Churubusco, Ind., announces that H. R. Buck-ner has been appointed plant manager. He will supervise installation of the new assembly plant and direct an extensive program for the company. Mr. Buckner was formerly plant manager of the Cleveland plants of the Oliver Corp.

Schield Bantam Co., Waverly, Iowa, has appointed B. J. Livengood as export manager. He has been West Coast sales representative for R. G. LeTourneau, Inc., Peoria, Ill., for the

past two years.

The Timken Roller Bearing Co., Canton, Ohio, announces that Bob Wagner, who has been narrating and writing the company's "Message to Americans" radio program, has joined the advertising department at the Canton plant. He assumed his duties as manager of the news bureau and related public relations work on June 25.

Marion Power Shovel Co., Marion, Ohio, has announced the election of John P. Courtright as executive vicepresident, in addition to his duties as vice-president in charge of sales and service. He has been associated with

the company since 1927.

Sterling Engine Co., Buffalo, N. Y., announces that Kenneth S. Thomson, formerly executive secretary of the Cleveland Association of Credit Men, has been elected president of the company. Leslie D. Calhoun has been named vice-president in charge of engineering. Harold W. Burkett continues as secretary and treasurer.

H. K. Porter Co., Inc., Pittsburgh, Penn., has opened a stock-carrying branch warehouse and sales office in Detroit, Mich., to serve all of Michigan. J. R. Alexander has been appointed district manager of the new

branch.

Wheelco Instruments Co., Chicago, Ill., has established a Canadian subsidiary, Wheelco Instruments of Canada, Ltd., with offices in Toronto. Officers are R. A. Schoenfeld, president; Francis Beaupre, vice-president-secretary; and E. J. Stevenson, vice-president-treasurer.

Chain Belt Co., Milwaukee, Wis., has announced construction of a new warehouse in Portland, Ore., for servicing the Pacific Northwest.

Round Associate Chain Companies, Cleveland, Ohio, announces that William A. Spence has been appointed general manager of Ohio Hoist & Mfg. Co., Cleveland. He will supervise the manufacture and sales distribution of hoists and other material handling equipment.

Pekay Machine & Engineering Co., Chicago, Ill., manufacturer of materials handling equipment, has opened a sales service and engineering office in Detroit, Mich., located at 13720

Puritan Avenue.

United Mfg. Co., Bedford, Ohio, has acquired a new plant in Bedford, Ohio, adjacent to Plant No. 1, for the manufacture of Caravan axles and accessory units.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed the State Tractor & Equipment Co., Phoenix, Ariz., as distributor in the state of Arizona,

OSGOOD

Air Control with Air Cushion Clutch opens great new era in shovel performance



Never before has power shovel operation been so smooth, efficient, and dependable as it is with OSGOOD Air Control and the patented new OSGOOD Air Cushion Clutch. Centralized levers

with air metering valves permit infinitely variable pressure in activating all motions. And the amazingly simple OSGOOD Air Cushion Clutch completely eliminates jerking and grabbing... provides instant, accurate control of loads at all times... automatically compensates for gradual wear on clutch linings. Results: More production, less wear on men and machines, greater profits. Write for Bulletin.

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WEIGHTOMETER gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. All producers of bulk materials handled by belt conveyors need this dependable check on production figures supplied by MERRICK WEIGHTOMETER.

Send for Bulletin 375

Merrick Scale Mfg. Co. Passaic, New Jersey

and the McCormick Machinery Co., Tulsa, Okla., as distributor in eastern Oklahoma, including the counties of Osage, Pawnee, Payne, Creek, Okfuskee, Seminole, Pontotoc, Garvin, Carter and Love.

Worthington Pump & Machinery Corp., Harrison, N. J., has appointed V. de P. Gerbereux as manager of the centrifugal pump sales division. He succeeds A. H. Borchardt who was recently elected vice-president in charge of centrifugal, reciprocating and vertical turbine pump sales. Announcement has also been made of a branch office opened in Harrisburg, Penn., which will be in charge of A. L. Mays, and will be a branch of the Philadelphia office.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the death on August 27 of Ray C. Newhouse, who retired in 1945 as manager and chief engineer of the basic industries department. He was 76 years of age. Mr. Newhouse joined the company in 1905 as a salesman and sales engineer in the Cincinnati district office of the crushing and cement machinery department. Five years later he became engineer and, in 1924, was named chief engineer of that department. Two years later he left Allis-Chalmers to become vice-president in charge of all engineering and operating of the Cowham Engineering Co., Chicago. In 1927 he returned to Allis-Chalmers and in 1944 was named manager and chief engineer of the newly formed basic industries department, now known as the processing machinery department. Mr. house specialized in crushing and mining engineering, designing many types of crushers, mills, kilns, coolers and dryers. He held nearly 100 U.S. patents and many foreign patents on machinery and methods for the manufacture of portland cement, among them being the Newhouse and Type "R" reduction crushers and his "Concavex" grinding bodies for cement and ore grinding mills.

The Babcock & Wilcox Co., New York, N. Y., announces that Ervin G. Bailey, vice-president, has been selected by the John Fritz Medal Board of Award to receive the 1952 John Fritz Medal and Certificate "for outstanding engineering achievements in the field of combustion and distinguished service to his fellows in advancing the engineering profession.

Yale & Towne Mfg. Co., Philadelphia, Penn., has announced the appointment of Thomas W. Curtin as director of purchases of the Philadelphia division. Formerly assistant director of purchases, Mr. Curtin succeeds W. B. Crossland, who has resigned. John T. McCarley has been promoted to assistant general manager, and Kenneth H. Bergstrom succeeds him as manager of production at the Philadelphia division.

Diamond Mfg. Co., Wyoming, Penn., announces the election of David C. Hall as president and general manager to succeed the late William M. Powell. Mr. Hall was formerly vicepresident and purchasing agent.

Independent Pneumatic Tool Co., Aurora, Ill., has transferred its Cincinnati, Ohio, branch, of which H. C. Brown is manager, to 3726-28 Floral

Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J., has appointed Austin L. Hawk as assistant manager of the Western sales district, Chicago, Ill. S. V. V. Hoffman has been named regional manager of the West Coast sales division for southern California, with headquarters in Los Angeles, Calif. A. N. Johnston, Jr., has been appointed assistant manager of the Central sales district, with headquarters in Pittsburgh, Penn., and D. H. Cotrille has been made West Virginia regional manager at Clarksburg, W. Va.

Koppers Co., Inc., Pittsburgh, Penn., announces that Peter V. Martin, sales manager of the metallurgical department, engineering and construction division, since 1947, has been appointed an assistant vice-president in the Freyn engineering department of that division, with headquarters in Pittsburgh.

Bemis Bro. Bag Co., St. Louis, Mo., has announced the following management and sales appointments: P. J. Hewitt, formerly sales manager of the Peoria multiwall plant, has been promoted to assistant manager. W. F. Mulvaney succeeds Mr. Hewitt as sales manager after serving as assistant





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Breco Ropeways are renowned throughout the world for speedy, efficient, and economical handling of various materials. Breco engineers can put at your disposal the accumulated experience of many years designing and operating materials handling equipment for some of the world's most difficult mining operations.



sales manager since last year. H. O. Parrent, formerly in charge of the sales office at Phoenix, has been appointed sales manager at Los Angeles. His successor as representative in Phoenix is L. P. Sempek, who moves to that city from Los Angeles. At the Memphis plant, the new sales manager is S. T. Newton, who formerly covered parts of Tennessee, Kentucky and Alabama as a salesman.

The B. F. Goodrich Co., Akron, Ohio, announces that the new \$4,000,000 industrial belting plant in Akron, Ohio, has been completed and is now in full production. According to A. Clarke Mack, manager of flat belting sales, a major part of the production of rubber conveyor belting is destined for American mines and quarries producing raw materials for defense industries. Nearly 40 percent of the conveyor belting being made in the new plant, he said, will be delivered to coal, iron ore and other mines. The remainder will go to major processing industries, public utilities and construction projects.

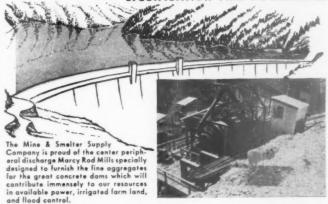
John A. Roebling's Sons Co., Trenton, N. J., has announced the appointment of James C. Barney as assistant manager of sales for the wire rope division, with headquarters in Trenton. He replaces the late George B. Stoess. Mr. Barney was formerly assistant manager of the Los Angeles district office and also handled the California oil field accounts.

General Electric Co., Schenectady, N. Y., announces that James H. Goss has been appointed staff assistant to Nicholas M. DuChemin, general manager of the small apparatus divisions. He was formerly manager of engineering of the control divisions. J. Herbert Behm has been named assistant to the manager of engineering on special assignments, fractional horsepower motor engineering divisions, Fort Wayne, Ind. Lee R. Beard will serve as division engineer of the a-c motor engineering division; Ray D. Jones as division engineer of the development engineering division; and I. E. Ross as division engineer of the d-c and specialty motor engineering division.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the election of J. L. Singleton, vice-president in charge of the general machinery division, and R. S. Stevenson, vice-president in charge of the tractor division, as members of the board of directors. They succeed the late Walter Geist and W. C. Johnson, W. E. Hawkinson, secretary and treasurer, has been named a vice-president in addition to his other duties. L. A. Watts has retired as manager of the service and erection section of the general machinery division, and will be succeeded by C. B. Smith, formerly superintendent of service and erection of the Atlanta district. C. P. Suykerbuyk, special engineer in the Los Angeles district office, succeeds Mr. Smith at Atlanta. Richard E. McElvain has been named sales representative in the Duluth branch office, specializing in crushing and mining equipment.

MARCY ROD MILLS AND

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BIG CREEK #4 CHIEF JOSEPH CANYON FERRY DETROIT BUGGS ISLAND CLARK HILL HUNGRY HORSE MT. MORRIS

FEATHER RIVER
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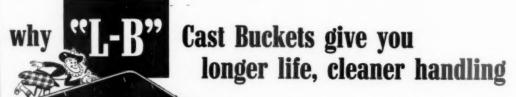
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For a long, durable life - they're made of top-grade malleable iron or Promal (the stronger, longer-wearing metal) to resist abrasion, corrosion and hard usage. Smooth, seamless surface minimizes friction and wear. Corners are reinforced to give added strength.

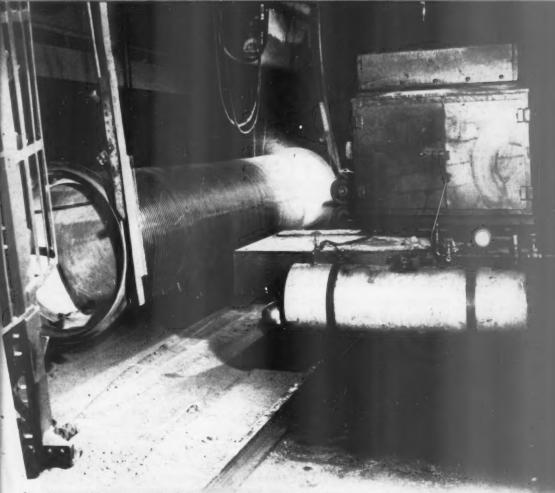
Link-Belt builds all sizes in six different styles . . . for either chain or belt mounting. Complete L-B line also includes steel buckets of various designs. Contact your nearest Link-Belt office for complete information.



Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Offices, Factory Branch Stores and Distributors in principal cities.

CONCRETE PRODUCTS

CONCRETE UNITS . READY-MIXED CONCRETE



Mortar coating being sprayed on outside of prestressed concrete pipe



with a CHALLENGE truck mixer

HIGHWAY WEIGHT LIMIT LAWS NEED NOT CUT DOWN YOUR PROFIT MARGINS...IF YOU STANDARDIZE ON CHALLENGE TRUCK MIXERS

Challenge engineers have found a way to expand drum volume while reducing mixer weight. But that's only part of the Challenge profit-building story. Challenge engineers take full advantage of the carrying capacity of your truck with the result that you can carry a greater load, boost your profit margin on every trip, yet comply fully with all load limit requirements. And, Here's the Payoff, Challenge Mixers cost less to buy...less to maintain...an unbeatable combination which adds up on your balance sheet as EXTRA profit for you!

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INDUSTRY NEWS

Lightweight Concrete

THE STATE GEOLOGICAL SURVEY at the University of Kansas is conducting experiments in the use of shale for the production of a lightweight concrete. Natural rock pumice does not occur in Kansas, but tests by the Geological Survey have shown that many shales will "bloat" when properly heated, which makes it possible to manufacture a lightweight concrete from abundant Kansas raw materials.

Masonry T-V Program

THE CONCRETE MASONRY MANU-FACTURERS Association's television program "A House to Live In" is being carried over into its second 26weeks series in Los Angeles, Calif., starting last August 26. William Allen and W. George Lutzi are the consulting architects for the program, with William W. Wyman as associate architect. The program has a television rating of 7.5, which is said to be one of the highest in daytime television. Three houses are being featured, one of which is a prize-winning design that has had national publicity. The association has stated that the program has definitely increased the block business, and that it is expected that the continuation of the program will bring in even more business.

It was also announced that, at the Los Angeles County Fa'r, Pamona, Calit., September 14-29, the C.M.M.A. had enclosed one of the permanent structures, 50 x 120 ft., with concrete block, which was done to show concrete block in a way representative of various plants—various sizes, shapes, textures and colors. This building had the C.M.M.A. name-plate affixed at each end of the building; also, the name-plate of each member whose block were used, on each member's section.

Concrete Pipe Meetings

AMERICAN CONCRETE PIPE Association has announced that the technical problems committee meeting of the concrete pipe industry has been delayed until after the executive committee meeting, due to the considerable amount of time the staff has had to spend on detail work in the office of the N.P.A. The meeting was to be held this month or at the same time as the A.C.P.A. Short Course (Edgewater Beach Hotel, Chicago, Ill., November 26-28, 1951). The technical problems committee is composed of E. H. Fox, ex-officio; H. S. Allen, chairman; I. E. Odendahl; E. F. Bespalow and A. M. Herman.

Three A.S.T.M. subcommittees are also meeting in Chicago th's past month, all at the Ambassador East Hotel. The subcommittee meeting on long range planning, is being held October 12-13. This committee is composed of E. F. Kelley, chairman; W.

E. Corbett; Samuel A. Greenley; Max Nearing and H. F. Peckworth. On the same dates, the subcommittee to discuss various matters with a similar subcommittee of American Association of State Highway Officials was also meeting and the members of that group are: for A.S.T.M.—E. F. Kelley, chairman; Harry W. Easterly, Jr.; Colonel R. R. Litchiser and H. F. Peckworth; for A.A.S.H.O.-W. F. Abercrombie; A. B. Cornthwaite; F. H. Morrison; T. J. Cochrane; P. L. Edwards; Bert Myers; C. E. Proudley and Bailey Tremper. On October 14-15, the subcommittee meeting to prepare a draft of a low head pressure pipe specification, is also being held. This committee is composed of Howard G. Curtis, chairman; E. F. Kelley; Samuel A. Greeley; J. A. Dunn; M. W. Loving and Henry A. Weigand.

The executive committee meetings being held this month at the La Fonda Hotel, Santa Fe, N. M., are: executive committee meeting of American Concrete Pipe Association, October 1-2; executive committee meeting of American Concrete Agricultural Pipe Association, October 3; executive committee meeting of American Concrete Pressure Pipe Association, October 4-5; and the Board of Governors meeting, Concrete Pipe Associations, Inc., October 5.

Concrete Cribbing

Universal Concrete Pipe Co., Columbus, Ohio, has announced the publication of an 8-page illustrated brochure, containing complete information about concrete cribbing. The publication presents a case-history of both open- and closed-face cribbing. Drawings show typical wall sections of varying lengths. Engineering specifications and instructions are also included, as well as photos of cribbing manufacture and actual installations.

Among some of the common uses listed for cribbing are bridge abutments and wings; railway and highway embankment retaining walls; erosion control walls; flood control levees; loading docks; grade crossing approaches; highway underpasses; hydraulic intake and outlet works; shore, river and harbor protection walls; and industrial property conservation.

Colored Concrete Brick

WORTHCRETE Co., Fort Worth, Texas, is a newly organized concrete products firm, operating as a division of Texcrete Co. Worthcrete Co. is specializing in the manufacture of colored concrete brick which are available in the standard size and in the new Roman style, in a wide variety of colors. The company also produces precast concrete joists and a complete line of Worthcrete building block and Texcrete Haydite concrete block. J. Weldon White is general manager.

McKinley Concrete Block Co. recently moved to its new location at 63rd and Eastwick Ave., Philadelphia. Penn.

CONSTRUCTION OF THE Kaw Valley Wilbert vault plant at Manhattan, Kan., has been delayed due to the recent floods in that district. The plant, started in June of this year, will produce concrete burial vaults. The company also operates plants at Wichita, Kansas City and St. Joseph.

LAKELAND CEMENT Co., Lakeland, Fla., recently announced plans to build a new plant at St. Petersburg, Fla., for the production of plain and reinforced concrete pipe, in sizes ranging from 12 to 72 in. in diame.er.

THE CARNEY Co., INC., Mankato, Minn., has begun operations at its new plant for the production of three ready-to-use concrete and mortar mixes. All are designed primarily for small repairs and use around the farm, home and factory. "Sand Mix Handicrete" is for lighter repairs and construction; "Gravel Mix Handicrete" for heavier concrete work; and "Mortar Mix Handicrete" for laying brick and block.

GROTZINGER READY MIX, Winnebago, Minn., has started production at a new ready-mixed concrete plant. Owner of the new company is Ed Grotzinger.

Anchor Concrete Step Co., Decatur, Ill., recently began operation at its new plant for the production of precast concrete steps. The steps are cast in adjustable forms and can be made in sizes ranging from four to six feet wide and from one to four steps high.

ALBERT HUCKABA and son, Don, of Mattoon, Ill., are expanding their ready-mixed concrete business by the establishment of a branch plant at Tuscola, Ill.

NORTHWESTERN IOWA PRODUCTS Co., Elkader, Iowa, has been sold to Jack Farrell of Elkader who will orerate the plant under the name Elkader Cement Block Co. G. H. Meyer was the former owner.

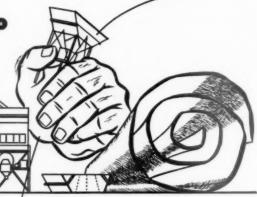
JOHNSON CONCRETE BLOCK CO., Blytheville, Ark., recently added a ready-mixed concrete plant to its concrete block and culvert business. Included in the new equipment are two mixing trucks. Cost of the expansion was approximately \$20,000.

PIERRE CEMENT PRODUCTS Co., Pierre, S. D., has been sold to Al'a Construction Co., also of Pierre.

LEFLER CONCRETE BLOCK Co., Charlotte, N. C., which has been engaged in a program of improvement and expansion during the past three years, is now preparing to double its production of concrete septic tanks.

PLAN AHEAD for YOUR READY-MIXED





and remember

RUTLER

Whether you're planning to build, expand or modernize a Ready Mixed Concrete Plant - call in the BUTLER Engineer now to talk things over. It



pays to give leisurely consideration to your planning - to allow time for study and discussion. That's where the counsel of the BUTLER Engineer can serve you best. Help yourself to his experience;

to his ideas. From his knowledge gained in planning hundreds of Ready Mixed Concrete Plants, you can reap the benefit of his ingenuity. For the BUTLER Engineer knows how to design for labor saving efficiency that shrinks costs

and expands your profits.

Compact ready-mixed plant requiring little yard space. This is one of three identical plants designed and built

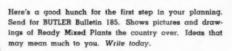
Butler Plant in Illinois is combined

block and ready-mixed concrete set-up. Foreground bin is for ready-

mixed. Rear bin supplies block plant. Both have common conveyor

and extra storage for cement.









989 BLACKSTONE AVENUE WAUKESHA, WIS.

300,000 YARDS maintenance still too low to be figured



Worthington Blue Brute Rock Drill operating ahead of the wagons collaring hole for laying out line drilling.

Two of the eight Worthington Blue Brute Wagon Drills that broke cost records for Rock

Construction Corporation. Note the amount of line drilling.

President Walt Dunham and Engineer A. Bruce Lattanzi in the company's Downsville Dam office.



Two 500 Worthington Blue Brute Air Compressors supplying air for drills at the Downsville Dam.

Walt Dunham, president, reported: "We have drilled as much as 700-800 we have shour day per machine. In 165 working days, the machines put out 300,000 cu yds with so little maintenance it can't be figured in cost per yard."

This job also used a number of Worthington Blue Brute Hand-Held Rock Drills. Says Mr. Dunham: "There has been absolutely no maintenance cost. Our operators like them better than anything they have ever used."

Contractors everywhere know that a Worthington Blue Brute team—air compressor and tools—makes mincemeat out of even the toughest jobs. See your nearby Worthington distributor for a demonstration. Worthington Pump and Machinery Corporation Construction Machinery Corporation, Construction Equipment Division, Dunellen, N. J.

BUY BLUE BRUTES



H.1.5



HERE'S WHY THEY ASK FOR 'INCOR'

Manhattan Miracle



Hard-Driving Program
Helps Cope with World's
Toughest Traffic Problems
- Manhattan Bridge Repaying
an Example

• New York City has just about the toughest traffic problem in the world. But it would be lots tougher were it not for a well-planned maintenance program which keeps everlastingly at the job of making the most of every inch of the existing facilities. Sound selection of methods and materials produces near-miracles in keeping traffic rolling while repairs and improvements are being made.

Sections of Manhattan Bridge's main roadway, carrying the bulk of nearly thirty million vehicles a year which use this famous span, were repaved while maintaining heaviest two-way traffic. Every detail of the job was planned and timed in advance.

Taking full advantage of the dependable high early strength of 'INCOR' AIR-ENTRAINING HIGH EARLY STRENGTH PORTLAND CEMENT assured quickest resues of the new paving. Dependable high ultimate strength, in turn, assures long-time, low-maintenance service—shown by many years' 'Incor' 'performance on highways in New York City and throughout the nation,

*Reg. U.S. Pat. Off.

MANHATTAN BRIDGE — Manhattan-Brooklyn Main Deck Repaying

Supervision: DEPT. OF PUBLIC WORKS, City of New York
General Contractor:

EDENWALD CONTRACTING CO., Bronx, N. Y.
Ready-Mix 'Incor' Air-Entrained Concrete:
COLONIAL SAND & STONE CO., INC., New York City



'Incor' paving on Manhattan

Bridge; right, placing concrete while maintaining twoway traffic, below, 'Incor'

Air-Entrained Concrete as-

sures long-time, mainte-

nance-free service.



LONE STAR CEMENT CORPORATION

OMEGE, ABILENE, TEX. - ALBANY, N.Y. - BETHLEHEM, PA. - BIRMINGHAM - DOCTON - CHICAGO - DALLAS - HOUSTON - INDIANAPOLIS Kansas City, Mo. - New Orleans - New York - Norfolk - Philadelphia - Richmond - St. Louis - Washington, D.C. Lone Star Cement, With 175 Bubbidiaries, is one of the world's largest cement producers: 17 Modern Mills, 125,000,000 Sacks Annual Capacity Harter Marblecrete Stone Co., Oklahoma City, Okla., produces 20,000 block per day and cures units in large autoclaves



Office and plant of Herter Marblecrete Stone Co., Oklahoma City, Okla

HIGH PRESSURE STEAM AUTOCLAVES

HARTER MARBLECRETE STONE Co., Inc., Oklahoma City, Okla., placed its new high pressure steam curing plant in operation during November, 1950. The company, in the concrete products business in Oklahoma City since 1919, employs approximately 90 men in its various operations which consist of ornamental cast stone, precast joist, roof slabs and other precast products. It produces concrete, shale, and purajce masonry units in its high production block plant. It recently placed in production a glazed faced block for interior use.

The block plant has two Besser Vibrapaes and a fleet of five Townotors. In the cast stone plant the company uses four Hyster lift trucks. All block manufactured by the Vibrapaes are high pressure steam and vacuum cured using a 12 hr. (open to open) cycle with 140 p.s.i. steam pressure. The actual steaming time is about 10 hr. The new plant has a capacity of 20,000 standard 8-in. block or equivalent per day.

There are five 8 ft. diameter, 95 ft. long, high pressure steam autoclaves. This large diameter is noteworthy in itself. When steam pressures are at 140 p.s.i. the total pressure against one of the cast steel ends is approximately 600 tons. Because of this high pressure, bolted ends are used as a safety precaution. The autoclaves were fabricated by McNamara Boiler Co. of Tulsa, Okla. Two railroad flatcars

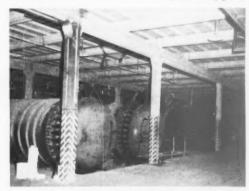
were required to transport each unit to the plant.

Harter Marblecrete Stone Co., Inc., has a complete testing and research laboratory adjacent to the plant and all manufactured items are subjected to routine testing to insure high quality products. Additional check tests are made by a commercial testing laboratory. The company found that block cured with high pressure steam have lower shrinkage properties than block cured by any other method. Hard aggregates show the least shrinkage, with expanded shale a close

second; pumice has the highest shrinkage. It has been proved that concrete in the block cured with high pressure steam is a more stable material and does not retrigrade in quality on further aging in the yard or in the wall. The high temperature cure obtained in the autoclave produces a crystalline structure in the concrete different from the amorphous binder believed to form in concrete cured by other methods.

Portland cement is contracted for by the year and is tested in the lab-(Consinued on page 186)

The plant uses five high pressure steam autoclaves, each 95 ft. long and 8 ft. in diameter





A complete testing and research laboratory checks all products manufactured by the plant



The plant features two black machines and has a capacity of 20,000 standard 8-in. black per day

PRESTRESSED CONCRETE CONFERENCE STRESSES PRECAST UNITS

First United States conference emphasizes economy and quality of precast units and stresses large volume market for development by concrete products industry

PRESTRESSED CONCRETE IS the most important development in heavy construction since the introduction of reinforced concrete and will gain rapid acceptance. That was the majority opinion of nearly 600 engineers, architects, contractors, research men and concrete technicians attending the First United States Conference on Prestressed Concrete at the Massa-chusetts Institute of Technology in Boston, August 14-16. Every possible phase of application of prestressed concrete was discussed and studied in the 44 papers delivered during the three-day meeting. General acceptance of this construction technique, relatively new in America, will come rapidly, it was predicted, as a result of the impetus given it by the confer-

Cost Favors Precasting

Concrete products plants are expected to take a leading part in developing practical applications of prestressing technique. A number of speakers emphasized the cost differential in favor of precast structural units as compared with the cubic yard cost of cast-in-place concrete. This cost differential was attributed to increased efficiency of mass production methods used in concrete block plants.

Several speakers expressed the fear that patented devices and methods

*Industrial public relations consultant. Chi-cago, Ill., for many years manager, Public Relations Bureau of the Portland Cement As-

By HUBERT C. PERSONS®

used in connection with prestressing may retard general use of prestressed concrete and urged full and free reporting of new developments for the benefit of the entire construction in-

Specifications Needed

There was virtually unanimous agreement that authoritative design and construction specifications for prestressed concrete are urgently needed and that a recognized code will be a tremendous stimulus to further progress in this new technique.

There was also general agreement that a vast amount of testing and research must be done so that structural designers may become as familiar with prestressed concrete as they are with reinforced concrete.

Plans were tentatively agreed upon to make the conference organization permanent. The advisory committee representing the six societies serving as co-sponsors of the conference is to be kept intact. Prof. Myle J. Holley, Jr., of the M.I.T. civil engineering department, who was conference coordinator, will be chairman. Members of this advisory committee and the organizations they represent are: L. II. Corning, Portland Cement Association; A. E. Cummings, American Concrete Institute: J. M. Garrelts, American Society of Civil Engineers; A. E. Horst and F. I. Rowe, Associated Gen-

eral Contractors of America; M. Hirschthal, American Railway Engineering Association; and R. A. Wank, American Institute of Architects.

The morning, afternoon and evening sessions on the opening day, August 14, and the morning session of the second day, August 15, were devoted to various special applications of prestressed concrete. These included tanks, pipe, bridges, buildings, pavements, piles and mass produced units.

The afternoon session, August 15. was on the general subject of materials, including concrete, wire and

Design and research were the subjects on the closing day. Subjects covered under design were: general considerations of design, basic concepts of design and design of continuous spans. Papers on research included reports on many specific research and test projects under varying condi-

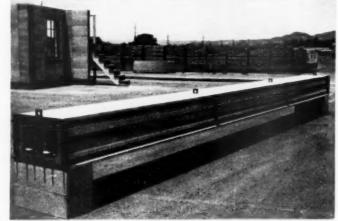
The large amphitheater in Huntington Hall was filled to capacity when the conference was called to order by chairman R. Archibald, bridge consultant of the U.S. Bureau of Public Roads, who introduced Dr. J. B. Wilbur, head of the department of civil engineering of M.I.T. who welcomed the visitors on behalf of the Institute.

The first paper and keynote address on "Why Prestressed Concrete?" was delivered by Leo H. Corning, manager of the Structural and Railways Bureau of the Portland Cement Asso-

He summarized the advantages of prestressing and, on the question of economy, pointed out that on projects in the United States, prestressing has offered equal or lower costs when compared with other types of construction, but that further economy would be realized when a code of practice is available.

Effect of Patents

The second speaker, F. S. Merritt, associate editor of Engineering News-Record, referred to prestressed concrete as "a new material only distantly related to reinforced concrete." He emphasized that this new construction technique presents many problems which are a challenge to structural designers. Mr. Merritt urged caution in the patenting of devices and methods used in prestressed concrete construction since it might retard fullest development. All new developments, he said, should be fully and freely re-



Prestressed 16-in. bridge plank designed for A.A.S.H.O. H-20 loading



Linings being made by centrifugal process for prestressed concrete



Prestressing the concrete cylinder

Prestressed Tanks

Curzon Dobell, vice-president of Preload Enterprises, Inc., New York, N. Y., presented a paper on prestressing as applied to circular structures such as tanks and pipe. He said the largest amount of preliminary work on prestressed concrete in America had been done on circular structures.

Where Europeans prestress to save materials, Americans prestress to save labor. Mr. Dobell said that far less labor is required in prestressing on circular structures than is needed on other types of prestressed construction. Construction methods for tanks and containers are now well standardized and widely used. He described the development of mechanical methods of applying circular reinforcement for surface tanks, underground tanks and standnines.

Prestressed Concrete Pipe

Development of prestressed concrete cylinder pipe by Lock Joint Pipe Co., during five years of research and testing, was described in detail by J. G. Hendrickson of the American Concrete Pipe Association.

He explained that prestressed concrete cylinder pipe might be called a semi-prestressed structure. It is made up in part of a continuously welded thin steel cylinder, made from hot rolled 16-gauge metal, although in special designs thicker material and different types of alloy steel may be used.

The speaker described two methods used in lining the steel cylinders with a suitable thickness of concrete. One method casts the lining in vertical molds. The other method is centrifugal. The steel cylinder serves as a mold and does away with the need for large numbers of heavy forms of various sizes. The cylinder also takes the place of longitudinal steel and serves as reinforcement against longitudinal strains. Where the size of a job makes it economically desirable temporary plants can be set up at the job site and local labor employed.

U. S. Ahead in Pipe Production

H. F. Kennison, chief engineer, Lock Joint Pipe Co., East Orange, N. J., said the annual production of prestressed pipe in America is at the rate of approximately 250,000 tons a year and exceeds all foreign production. He then showed graphs and charts giving the theoretical analysis of the strengths and stresses considered in the design of prestressed concrete cylinder pipe.

Prestressed Bridges

M. Hirschthal, of Hirschthal and King, consulting engineers, presided over the Tuesday afternoon session which was devoted to a review of the art of prestressing as applied to bridges.

C. C. Zollman of the Kansas City, Mo., engineering firm of Howard, Tammen, Needles & Bergendorff, presented a review of European experiences with prestressed concrete bridges. He said the economy of prestressed concrete had made it a principal construction material in Europe and il'ustrated construction details on bridges in Sweden. Belgium, France, Germany and Africa.

A survey of experience with prestressed concrete bridges in the United States was given in a paper by S. S. Baxter, acting chief engineer, and M. Barofaky, assistant chief engineer, Bureau of Engineering Surveys and Zoning, Department of Public Works, Philadelphia, Penn. The paper, delivered by Mr. Baxter, was devoted chiefly to detailed descriptions of the testing and construction on the Walnut Lane bridge in Philadelphia.

Prestressed Concrete Block Bridges

The immediate opportunity for concrete products plants to take a leading part in prestressed concrete developments was shown in a paper by R. H. Bryan, of Bryan & Dozier, consulting engineers, Nashville, Tenn. He described the construction of a prestressed concrete bridge in Madison

county, Tenn., with structural members of machine-made concrete masonry units. Mr. Bryan's firm has also designed and completed a prestressed concrete football stadium and a store and lodge building using standard concrete block in the prestressed structural members.

Mr. Bryan called special attention to the low cost of precast concrete masonry units as compared with castin-place concrete. He compared 1936 costs in Tennessee with today's costs and noted that in the short interval of 15 years the cost of cast-in-place concrete had advanced 230 percent, while the cost of a concrete block unit had increased only 10 percent. He explained the difference by saying that while both methods had experienced increased labor costs in forming and placing and increased material costs, production methods had changed but little in cast-in-place construction. The rate of placing concrete on the average bridge job where materials are mixed on the site remains about the same as it was 30 years ago. Production has remained practically constant while labor costs have increased.

Machine Efficiency Up

"Fifteen years ago the average block machine was producing about 350 units per hour and required five men to operate efficiently," Mr. Bryan said. "Today, the average machine will produce '750 units per hour of any specified strength up to 5000 p.s.i, net and requires only three men for efficient operation. Here we have the rising cost of labor and materials offset by an increase in production and efficiency made possible by mass production methods."

Block Used On Michigan Bridge

The next paper was a progress report on the use of concrete masonry units cast on a Besser Vibrapac machine for a prestressed concrete bridge in Oakland county, Mich. This was given by C. L. Johnson of Johnson

& Anderson, consulting engineers, Pontiac, Mich.

"Because of the economy offered by machine-cast concrete," Mr. Johnson said, "the bridge was designed to make use of an I-section girder which is being assembled of precast block. They are 24 in. high, 8 in. deep, with 16 in. wide top and bottom flanges. The top flange is 3 in. thick, the bottom flange and the web are 2½ in. thick. End sections to provide for anchorage and bearing are built up of 8- x 16- x 24-in. block with provisions for proper bedding of anchor plates and with openings for the strands."

The block used for the bridge and the machines and labor used in testing were furnished by Standard Building Products Co., Detroit, Mich. Bridge strands and anchorages were provided by John A. Roebling's Sons Co., Tren-

ton, N. J.

A paper describing the construction of a prestressed concrete pedestrian bridge 110 ft. long over the Arroyo Seco Freeway near Los Angeles, Calif., was delivered by J. C. W. Carroll, president of Prestressed Corp., Kansas City, Mo. The paper was prepared by K. H. Middendorf, vice-president and chief engineer of the Prestressed Corp., and F. W. Panhorst, bridge engineer, State Division of Highways, Sacramento, Calif. According to the authors, the California highway division sees prestressed concrete as a valuable tool.

Four papers on the use of prestressed concrete for buildings and two papers on prestressed concrete pavements were presented at the Tuesday night session of the conference. R. A. Wank of Fellheimer & Wagner, architects and engineers, was chairman of the session.

Cost Favors Shop Casting

J. K. Gannett, vice-president and director of engineering and research of The Austin Co., Cleveland, Ohio, discussed the cost aspects of precast units and cast-in-place concrete for prestressing projects. "If prestressed beams and girders for one-story industrial buildings are precast on the job," he said, "we estimate that the field labor will cost about twice as much as it would for a steel building, exclusive of mechanical and electrical trades. . . . The production economies to be realized by precasting of prestressed members in plants set up for that purpose are axiomatic."

"One of the greatest advantages to be obtained by shop fabrication of prestressed concrete members," Mr. Gannett said, "is the close control which this would assure. It would simplify the problem in controlling the quality of concrete and the slump and would make it possible to set up more efficient equipment for the external vibration of members. Even where it is not practical to precast entire members in the shop because of their weight, it would usually prove advantageous to cast the end blocks and assemble the cables so that they will be ready for use when they reach the site."

Problem for Transit Mix

If prestressed members are fabricated in the field, Mr. Gannett pointed out, it will be necessary to determine whether or not it will be practical for ready-mixed concrete companies to supply the low slump concrete which will probably be required with existing equipment, or whether they will have to change their set-up to meet the requirements.

He said that if a sufficient market can be developed for prestressed concrete buildings to justify the establishment of central casting plants to supply industrial areas, it would provide a strong impetus toward the use of this technique. Development of standard designs which would lend themselves to large-scale production of units would be almost a necessity.

A. T. Waidelich, vice-president and manager, research division of The Austin Co., fo'llowed Mr. Gannett. He presented slides and engineering details of some phases of the year and a half of research conducted by Austin engineers into the potentialities of prestressed concrete for industrial and commercial buildings.

The tests involved beams 40 and 60 ft. long cast with 2-in. slump, 8-bag mix concrete made with early strength cement. Both beams were post-tensioned to a working stress of 120,000 p.s.i. First cracks developed at twice the design load. Each beam sustained more than four times the design load before failure.

Prestressing in Oklahoma

P. F. Blair, Jr. of P. F. Blair & Sons Co., Tulsa, Okla., presented a paper on the use of prestressed concrete for smaller buildings and presented details of projects in Oklahoma. Builders should not overlook the most modest uses of prestressed concrete, he declared.

Niels Thorsen, an engineer of the Freyssinet Co., New York, N. Y., delivered a paper on the use of continuous prestressed concrete designs which he said had been used successfully in Europe. Prestressing, he said, has proved economical for long spans, heavy loads and where design can be standardized.

Prestressed Pavements

L. Coff, New York consulting engineer, read a paper on the use of prestressed concrete for pavements, which he contended would increase load carrying capacity and lengthen the life of concrete pavement for heavily traveled highways or busy airports. He declared that increasing volumes of traffic and high axle loads create a serious problem which prestressed concrete can aid in solving.

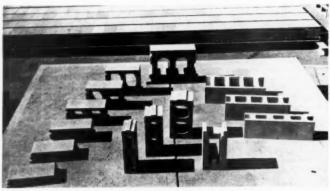
B. F. Friberg, vice-president, Granco Steel Products Co., Granite City,
Ill., also delivered a paper on prestressing for concrete pavements, recommending both transverse and longitudinal prestressing. He claimed that
although prestressing would cost approximately \$2000 a mile, \$10,000 a
mile could be saved in concrete.

Mass Produced Units

C. B. Solomon, vice-president, George B. H. Macomber Co., was chairman of the morning session on the second day of the conference. The subjects were concrete piles and mass produced units.

A. E. Cummings, director of research, Raymond Concrete Pile Co., New York, N. Y., described development work done by his company with precast, prestressed concrete piles both pretensioned and post-tensioned. Full scale tests made on piles up to 86 ft. long indicated that hollow prestressed concrete piles have a decided advantage.

K. P. Billner, president of the Vacuum Concrete Corp., Philad-lph'a, Penn., presented a technical paper on mass produced, prestressed concrete units, in which he outlined the special applications of prestressing and poststressing. He expressed the opinion that factory-controlled products show a better and more uniform quality than concrete cast-in-situ. Prestress-



Various concrete units used in assembly of Strestcrete products

ing offers special advantages for factory-made concrete products, whereas post-stressing generally is more adaptable for large concrete members

made in the field.

Following Mr. Billner's paper, D. O. McCall, chief engineer of the Basalt Rock Co., Inc., Napa, Calif., continued the discussion of mass produced prestressed units. He declared that the use of mass produced units in prestressed concrete is still in its infancy and that it represents an ever expanding field for manufacturers of concrete products.

He said that block producers throughout the country have long been endeavoring to find new outlets other than conventional masonry construction for units which can be produced on an automatic block machine. Fields such as roof and floor slabs, wall panels and bridges have for many years been a challenge to the ingenuity of those who have existing facilities for mass production of concrete units. Experience with precast concrete sections indicated that important economies could be effected in jobs requiring substantial quantities of identical units.

Mr. McCall then described the development of Basalt's Strestcrete system of construction. This system, he said, fills the basic requirements of having fully cured elements in stock available for rapid assembly and delivery, maximum flexibility of dimensions without expensive mold changes. and the ability to obtain continuity between sections. (The various types of Strestcrete roof and floor slabs and wall assemblies were described in detail in July, 1951, issue of Rock PRODUCTS, page 109, and January, 1950, page 197.)

Materials

H. L. Goodell, chief engineer, Maxon Construction Co., Inc., was chairman of the Wednesday afternoon session on the general theme of materials.

The first paper by H. L. Kennedy, manager, cement division, Dewey & Almy Chemical Co., Cambridge, Mass., was on high-strength concrete. He said that while strength is important, other factors involved in prestressed concrete in addition strength should be analyzed. The use of air-entraining cement has been a forward step, he said, and emphasized the importance of knowing how to obtain the best concrete mix. Curing, cement fineness, water-cement ratio, bleeding, stress distribution, optimum fineness modulus, autogeneous healing, admixtures, accelerators, dispersion and air-entraining agents were discussed.

R. F. Blanks, chief, Research and Geology Division, U. S. Bureau of Reclamation, Denver, Colo., in a discussion of Mr. Kennedy's paper, emphasized the need for a great deal more research on prestressed concrete.

H. J. Godfrey, assistant chief development engineer, John A. Roe-bling's Sons Co., Trenton, N. J., em-





Top: Prestressing reinforcing steel in 10-in. floor slabs using pneumatic impact wrench lat far end of table) and a calibrated torque wrench. Bottom: Grinding units for 4-in. roof and floor slabs

phasized that prestressing is dependent on high tensile strength wire. Wire must meet a strength test of 250,000 p.s.i. as compared with 80,000 p.s.i. for the best grade of reinforcing bars. Elastic properties of wire, he said, are vital to the success of prestressing.

A. C. Loewer, associate professor of civil engineering, Lehigh University, Bethlehem, Penn., described pilot tests on wire conducted at Lehigh in cooperation with the Roebling organization. He said creep is no problem under 225,000 p.s.i.

W. O. Everling, director of research, American Steel & Wire Co., Cleveland, Ohio, followed with a talk on the manufacture of wire.

A paper on reinforcing bars as used in prestressed concrete, prepared by Donovan Lee, consulting engineer, London, England, was presented by Cliff Scott, of the Nicholson Co., Inc., New York, N. Y. He expressed the opinion that less loss of prestress occurs with the use of bars than with the use of wire. Pretensioning, he said, offers the best field for bars at the present time.



In tests made by The Austin Co., engineers and builders, Cleveland, Ohio, hydraulic jacks were used to apply test loads to prestressed concrete beams at two paints. In the test shown the jacks were exerting a total load of 110,000 lb. on the 40-ft. signed for a 30,000 lb. load. It showed to deflection of 4 in. at this point and cellapsed under a load in excess of 117,000

J. J. Connelly, of the department of metallurgy, M.I.T., described technical methods of manufacturing steels of the desired properties for use in prestressed concrete. He said there is a need for more adequate data on the specific action of steel bars in prestressed concrete.

Prof. W. C. Voss, head of the M.I.T. department of building, engineering and construction, was chairman of the Thursday morning session, August 16.

Economic Considerations

The first paper of the day, delivered by M. Fornerod, chief engineer, Preload Enterprises, Inc., New York, N. Y., was on general design and economic considerations in the planning of prestressed concrete structures. His paper covered economics in the development of prestressed concrete, coat factors, general considerations affecting bridge design, comparisons with reinforced concrete, safety factor criteria, failure load calculations, and a design code for prestressed concrete.

W. E. Dean, engineer of bridges, State Road Department, Tallahassee, Fla., led a discussion of Mr. Fornerod's paper and emphasized cost and safety as the most vital factors in the further development of prestressed concrete construction.

Design Calculations

In a paper on prestressed concrete design concepts, Thor Germundsson, Structural and Railways Bureau, Portland Cement Association, analyzed the steps to be investigated in designing prestressed concrete structural members.

"Individual steps in design calculations . . . ," he said, " are quite simple and similar to design procedure encountered in conventional reinforced concrete, but there are more stress combinations to consider and more design stages to investigate. In a routine design problem, as many as seven loading stages may have to be investigated."

O. G. Julian of Jackson & Moreland, Boston, Mass., led a discussion of Mr. Germundsson's paper and emphasized the importance of a code committee to formulate allowable stresses. He said a committee is now at work.

A paper on analysis of continuous prestressed concrete structures, by G. H. Paris and A. L. Parme of the Portland Cement Association, was read by Mr. Paris. Graphs and charts gave details of two basic methods of creating the desired distribution of prestress in continuous structures. One method uses members of constant cross section with curved cables and the other uses members of variable depth with straight cables.

More Research and Code Needed

A. E. Cummings, director of research, Raymond Concrete Pile Co., was chairman of the closing session of the conference, Thursday afternoon, August 16. Research was the theme of the session.

C. P. Siess of the civil engineering department, University of Illinois, Urbana, Ill., said there are many practices in connection with prestressed concrete not yet substantiated by research. Before the use of this technique can become extensive it is essential that design specifications be formulated and embedied into a code, and research is urgently needed to provide the basis for design specifications.

A. R. Anderson, consulting engineer, Springdale, Conn., described studies conducted for the Cement Products Corp. at Pottstown, Penn., in which 30-ft, prestressed beams were tested.

B. J. Baskin, chief engineer, Concrete Products Co. of America, Philadelphia, Penn., described the making of precast concrete roof decks up to 36 ft. long and 16 in. to 26 in. deep. Post-stressing was used and high strength concrete was obtained by the vacuum process.

In a paper on some results of research into the field of concrete products development, B. Birdsall, assistant chief engineer, bridge department, John A. Roebling's Sons Co., expressed the belief that "prestressing belongs in the factory."

Describing a search for suitable an-

chorage fittings, Mr. Baskin said Bryan & Dozier, consulting engineers, and the Nashville Breeko Block and Tile Co., Nashville, Tenn., have developed a satisfactory end block and fittings.

Glass Fibers for Prestressing?

R. B. Crepps, director, testing division, Owens-Corning Fiberglass Corp., Newark, Ohio, intrigued his audience by a paper suggesting that glass fibers could be used in prestressing concrete. He said 204 strands of glass fibers wound around a drum while hot will produce a cord with tensile strength above 200,000 p.s.i. and show no yield under tension.

Lightweight Aggregate?

A research paper by R. K. Steele, director, and J. H. Libby, project engineer, structures research department, U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif., was delivered by Mr. Libby. He said tests of beams made with expanded shale aggregate were not successful, and questioned the use of any lightweight aggregate in prestressed concrete.

Subjects for Research

A research paper by Jack R. Janney, assistant development engineer, structural development section, Portland Cement Association, suggested the urgency of determining the characteristics of prestressed concrete under adverse conditions. Many American engineers will not use prestressed concrete until points in question regarding design and performance characteristics are more charly defined. Major points of investigation included climatic, temperature and chemical exposures, heavy impact and vibration such as from heavy machinery, and how to protect steel from fire,

Load tests conducted at the Portland Cement Association laboratories on a full sized prestressed concrete railroad trestle slab were described by Mr. Janney. The tests were made in cooperation with the Association of American Railroads.

E. J. Ruble, Association of American Railroads, followed Mr. Janney with a description of how SR-4 strain gauges and electromagnetic gauges were operated in the load tests.

A paper describing wire tests and anchorage studies on experimental slabs at Rice Institute in Houston, Texas, by R. L. Reid, consulting engineer, and Adrian Pauw, assis ant professor at the Institute, was delivered by Mr. Pauw.

Prestressed Assemblies Offer Wide Possibilities

The economy of assemblies of precast, prestressed concrete masonry units will make prestressed concrete structural members available for a wider range of structures and will supersede present procedure, was the

(Continued on page 186)

Advertising Builds Markets for Precast Concrete Panels

By C. E. WRIGHT

A DVERTISING CONCRETE PRODUCTS to the general public through newspapers is not as easy a job as advertising a product that people can go in and buy over the counter. Maule Industries, Inc., Miami, Fla., lets an advertising agency do most of the worrying about the kind of copy that should be presented to newspaper readers, which of course include many architects, engineers and building contractors.

Maule's chief aim is to keep its name in the foreground in south Florida and the company uses Miami newspapers quite extensively. Whenever something out of the ordinary develops in its work, Maule uses such an occurrence for advertising copy. Such was the case recently when Maule furnished a quantity of precast concrete slabs 8 x 11 ft. for the walls of the Five-Fifty Building at 550 Bricknell Avenue, Miami, said to be the first building of this type constructed in the United States.

More than 30 experiments in casting various concrete mixes to combine strength, surface finish and practical methods for large scale production were carried out before the final product was arrived at. "We were faced with singularly difficult prob-lems," said F. Paul Anderson, general superintendent in charge of all Maule production. "Over a period of five weeks we undertook more than 30 experiments. Some of the experiments dealt with varying concrete mixes; others had to do with 'face up' or 'face down' methods of production. Various compounds were used to reach what was considered the desired 'reveal' on the aggregate that was to be exposed on the outside surface of the building. Every conceivable type of experiment was necessary as these slabs of several square feet of concrete 4 in. thick were subject to many conditions. However, samples were finally made that met the architects' approval and from then on the process was considered to be of a standard nature.

Frank Watson, one of the consulting architects with the firm of Robert Law Weed, Miami, stated that "precedent definitely was established when this precast concrete slab wall construction proved acceptable to the Miami Building Department under existing building codes." He pre-dicted that Maule Industries-type concrete slabs will be used by architects on future construction. Com-

Your Best Best Is
CONCRETE
CONCRETE PRODUCTS MAULE Example of an advertisement Maule Industries runs in Miami newspapers Call Maule Bighost Quality menting on the construction advan-

Watson said: "Lightweight concrete panels or slabs of this type decrease the dead load on the end of the cantilevered floor slab. Another feature is that the panels are reinforced with two layers of reinforcing to minimize warp. They were designed to withstand hurricane winds."

The unusual features of the construction of the Five-Fifty Building were brought about by the fact that a tremendous amount of plumbing was required to meet medical requirements, as the building is being occupied largely by physicians.

N.C.M.A. Promotional Aids

NATIONAL CONCRETE MASONRY ASSOciation recently published a brochure describing promotional aids available for use or distribution by member firms. The 6-page folder contains prices and descriptions of these various items.

One of the promotional aids described is the kit of two-column advertising mats which have been prepared to assist members in planning their local advertising programs. mats, featuring the homes contained in N.C.M.A.'s new plan book, "Concrete Masonry Homes of Today and Tomorrow," give members a good opportunity to promote their products at considerably less expense. Also described in the booklet are the threecolumn advertising mats, featuring the plans in the "Home of Distincseries. N.C.M.A. states that many members conducting local advertising campaigns have reported tremendous success. One advertising campaign cited was that sponsored by Worrall Brothers, Inc., St. Matthews, Ky. As a result of a series of ads which the company ran in a Louisville, Ky., newspaper, about 1700 copies of the N.C.M.A. new plan book were distributed to prospective customers.

Visual Aid Program

NATIONAL CONCRETE MASONRY Asociation has completed a set of slides illustrating approved concrete masonry design which will soon be re-leased to 67 leading architectural schools in the United States and Canada. This is N.C.M.A.'s contribution to the visual aid program sponsored by the Producers' Council and the Association of Collegiate Schools of Architecture. It has been estimated that approximately 2500 students graduate from architectural schools every year. Through this program these architects of tomorrow should have a much better knowledge of concrete masonry design.

N.C.M.A. has published a booklet, "Concrete Masonry Construction Details," which contains all of the drawings and manuscripts from its visual aid slides. These are available for mailing to architects, contractors, engineers, draftsmen and others. The visual aid slides will also be made available soon at \$6.50 per set to mem-

ber companies.



Batching facilities at Jim Woodruff dam. Cement and aggregates are received on railroad spurs at far left. Note the frame for a car shakeout (behind cement sile) that extends over the four tracks. Storage piles for line and coarse aggregate are in the center of the picture. Material can be fed direct to the batching plant or dropped off at stockpiles. Botching plant is at far right. The belt conveyor for aggregates to the plant passes over a major highway.

Producing Concrete of Controlled Temperature for Jim Woodruff Dam

IM WOODRUFF dam now under construction on the Apalachicola river in Florida is not a large concrete structure compared to many of the nation's larger dams. It will be 6130 ft. long, much of which will be compacted earth fill and have a maximum head of 33 ft. The locks and spillway will require only about 300,000 cu. yd. of concrete. Jim Woodruff dam is probably one of the smallest concrete structures in the United States to use artificial cooling of aggregate. Artificially chilled air is used for cooling. The dam is being constructed by Perini, Walsh, Mills and Blythe Bros. Construction Companies under the direction of the Corps of Engineers, U. S. Army.

The principal purposes of the dam are the production of hydroelectric power and the provision of a 9-x 100-ft. navigation channel on the lower Chattahoochee and Flint rivers. The project will develop 30,000 kw. using three 10,000-kw. generating units.

The dam is about 1000 ft. below the confluence of the Chattahoochee and Flint rivers, which form the Apalachicola river, on the Georgia-Florida state lines. The development is part of a general program to improve these rivers which visualizes construction of the Upper Columbia dam and lock, the Fort Benning lock and dam, and Buford dam. The town of Chattahoochee is about 1½ miles from the dam site.

On Jim Woodruff dam, as on most of the large governmental sponsored construction projects, four sizes of coarse aggregates and one size of sand are being used. Satisfactory aggregate of either class is not available at the dam site. Coarse aggregate is shipped from the Pelham, Ala., crushed limestone plant of Alabama Aggregates Co. and sand is shipped from the new plant of Consolidated Gravel Co., Inc. of Columbus, Ga. The sand comes from a pit a few miles south of Phenix

By WALTER B. LENHART

City, Ala. The aggregates are delivered to the dam site by rail. The haul for coarse aggregate, which is along a circuitous route, is about 530 miles and for sand, approximately 225 miles. Type II portland cement is shipped to the plant in closed hopper cars from the Mobile, Ala., plant of Ideal Cement Co., a rail haul of about 245 miles.

Material Unloading

At the aggregate and cement unloading point about 1½ miles from the construction site, the contractor built four parallel spur tracks. An unloading hopper was built under each of these spurs and each hopper is served by an apron feeder which feeds the belt conveyor system used to build up the ground storage piles. The aggregate stockpiling system was designed by Link-Relt Co. It includes a tripper over the top of the stockpiles and provision was made for aggregates to bypass (by going over the top) the storage system and be carried direct to the batching plant.

A Robins car shakeout was mounted over the four apron feeders under the rail spurs. The shakeout rides steel



One of the first blocks of concrete placed in the dam proper. The first lift is $2\frac{1}{2}$ ft.

I-beams so it can be used on any of the four unloading points. A Robins-Myers electric hoist is part of the shakeout assembly. Unloading time is greatly expedited by the device. Portland cement is handled by a Fuller-Kinyon system and can be stored in a 5000-bbl. steel silo near the unloading point, or pumped about 500 ft. directly to the batching plant.

A reclaiming belt runs under the stockpiles. A small apron feeder in the tunnel feeds the largest size aggregate to this belt and the rest of the aggregates fed to the belt are controlled by conventional clamshell type gravity gates. For the aggregates to reach the batching plant the inclined belt passes over U. S. No. 90 and a special steel truss forms the span of the inclined conveyor structure over the highway. All belts are 30-in. Goodyear rayon belts.

In the batching plant are two 4-cu. yd. Kochring mixers with Johnson batching facilities. The plant normally delivers 100 cu. yd. of concrete per hour.

Aggregate Cooling

The coarse aggregates in the bins over the batcher are cooled by blowing cold air through them. Five fans each of 15,000 c.f.m. are used or a total of 75,000 c.f.m. The air is chilled to 38 deg. F. in conventional refrigeration equipment and after passing through the material the temperature of the air is about 42 deg. F. This return air is then washed to remove any dust after which it is recooled and again circulated. The cooling cycle for the aggregate requires about 1½ hr.

The steel bins for the aggregates are of special construction and a general idea of the cooling technique can be observed in the drawing. The bin is essentially a bin within a bin with the cold air entering near the top and as it passes downward some of the air



The earth-fill bulkhead around the foundation work is augmented by sheet grouting around work areas to keep out ground seepage

enters the inner bin through suitable ports. Near the bottom of the inner bin the air can take divergent courses; some goes upward through a "diffuser" and some recirculates around the aggregate in the lower part of the main bin. It will be noted that the portland cement storage receives some cooling from the cold air due to the arrangement of bin construction.

One noticeable feature of such a cooling installation is the marked increase in the amount of dust to contend with and all switches and cement scales are housed in. In addition four 10,000 c.f.m. fans are used to control the dust. The aggregate handling system is arranged so that the operators in the mixing plant have remote control over all steps.

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Concrete

For concrete placement the first lift is 2½ ft. followed by another 2½-ft. lift and thereafter by 5-ft. lifts. The block have a maximum width of 35 ft. Darex is used in the concrete with 6 percent air being the specified maximum air entrainment; the contractor tries to hold it at 5 percent.

Specifications require that concrete be delivered to the forms at not more than 65 deg. F. and not less than 40 deg. F. Concrete cannot be placed when ambient temperatures are below 35 deg. F. except by special permission. Heated concrete can be specified although facilities are not available at the mixing plant for this unlikely contingency. From the batching plant the concrete is hauled by trucks that carry 4-cu. yd. rectangular buckets with final placement being made by a battery of Page walker-type cranes.

Foundation Rock

Foundation rock under Jim Woodruff dam is typical white to gray colored Ocala limerock and when wet is a relatively soft material. It is pockety and mud seams are present. Considerable detailed work is required to clean the mud out of all these pockets and to seal off underground water channels. Men shovel out these pockets as best they can, followed by washing with water ejected by "mud hens' which are air operated ejectors. In some places it is about 70 ft. from ground surface to stable bedrock and to keep out the water during construction an earth cofferdam augmented by sheet grouting of the rock foundation around the perimeter is used. The

Pipe ducts on the outside of the batching plant are part of the cold air assembly for cooling coarse aggrapate



whole foundation area will be stabilized later by extensive grouting techniques. In one of the lock sections a horizontal water seam was encountered which was later sealed off but at times up to 15,000 g.p.m. were being pumped out of the area.

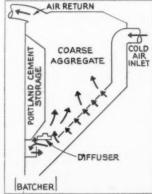
Specifications

Specifications for Jim Woodruff dam other than the cofferdam grouting do not show many marked changes from similar specifications for Corps of Engineers dam construction in other areas. However, some of the main features as regards coarse and fine aggregate and the concrete follow.

Table I. Coarse aggregate, screen sizes

	Passi	ng, percent	by weigh	t
Sieve 7 in. 6 in.	No. 4-% in.	%-1½ in.	11/4-3 in.	8-6 in. 100 90-100
8 in. 2 in. 1 1/2 in. 1 in. 1 in. 1 in. 1 in. 1 in. No. 4	90-100 80-55 0-6	90-100 20-45 0-10 0-5	90-100 20-55 0-10 0-5	0-15 0-5

For manufactured sand the specifications are as given in Table II.



Elevation of one of the cooling bins

Table II. Sand-manufactured or combined with natural sand

	Passing,	Retained,
Sieve	percent	percent
% in.	100	0
No. 4	95-100	0-5
No. 8	88-92	8-12
No. 16	70-80	20-30
No. 30	45-56	44-55
No. 60	20-30	70-80
No. 100	5-10	90-95
No. 200	9-3	97-100

F.M. for all sand delivered to the mixer is not less than 2.40, or more than 2.90. The specifications further state: "The grading of the fine aggregate shall be controlled so that the F.M. of at least 9 of 10 test samples of the fine aggregate . . . shall not vary more than 0.10 from the average F.M. of all samples tested the immediate previous 30-day period."

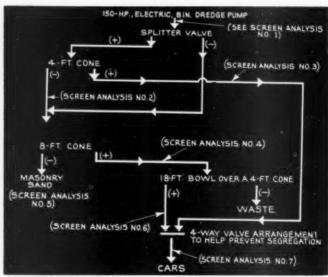
The gradation specifications for natural sand which is being used are:

Table III. Natural sand

	Cumulative perc	ent by weight
Sieve 3, in. No. 4 No. 8 No. 16 No. 20 No. 50 No. 100	Passing 100 95-100 80-90 55-75 30-60 12-30 3.5-10	Retained 0 0-5 10-20 25-45 40-70 70-88 90-96 5
140. 100	0.0-10	Sum (X)
*Divide "X"	by 100-F.M. excep	pt the % in.

The concrete has from 3 to 6 bags of cement per cu. yd. depending on where it is used. The cement used is low alkali. Cement that is four or

more months old cannot be	
out retesting.	
Accuracy required of ma	terials de-
livered by batches is to be:	
Cement	1 percent
Water	1 percent
Aggregate smaller than 11/2	
in,	2 percent
Aggregate larger than 11/2	
in.	3 percent
Admixture	3 percent
Mixing time is specified a	s follows:
1/2-cu. yd. batch or smaller	1 1/4 min.
%-1 1/2 cu. yd.	114-min.
2 to 3 cu. yd.	2 min.
4 cu. yd.	21/2 min.



Flow diagram of Consolidated Gravel Co., Inc., sand plant at Phonix City, Ale.

Mechanical vibration is specified with not less than 6000 impulses per minute except for the 3- to 6-in. mix where 4500 impulses are specified. The amplitude is to be sufficient to insure satisfactory consolidation.

Personnel

The personnel at the construction site for Perini, Walsh, Mills and Blythe Bros. Construction Co. is headed by A. R. Berry, project manager; D. C. Cannon, project engineer; and John J. Fiera, construction superintendent. For the Corps of Engineers, Col. Walter K. Wilson, Jr. is district

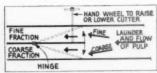
engineer in the Mobile, Ala., district; Walter C. Knox is resident engineer for the dam and James M. Polatty is assistant resident engineer.

Fine Aggregates

Coarse aggregates for Jim Woodruff dam are shipped from the Pelham, Ala., plant of Alabama Aggregates Co. Pelham is about 20 miles south of Birmingham and in the limestone belt. To meet project requirements no important changes were necessary in the plant aside from some screen changes. However, at the Consolidated Gravel Co., Inc., opera-



A blended sand is produced by using the classifiers in the structure on the left. Consolidated Gravel Co., Inc.



Splitter valve used to divide fine and course fractions of sand

tions, Phenix City, Ala., a new plant was put into production to meet the sand specifications. Phenix City is across the Chattahoochee river from Columbus, Ga., and about 160 miles north of Jim Woodruff dam.

In many respects the new plant is a simple structure using three Auto-Vortex classifiers manufactured by Charles E. Wood Co. to make a continuously blended material. At the time of inspection about 1500 carloads of sand had been shipped to the dam site without a single rejection.

A Wood classifier is a small version of a shallow thickener but is so mounted as to be the pan of what might be considered a pan-scale. The units are provided with slowly revolving arms to which paddle-scrapers are fixed. When the total weight of the pulp plus machine reaches a preset amount, a gate in the bottom of the classifier automatically opens allowing the excess weight of sand to do not not the total to the unit. They operate at 2 r.p.m. and each uses a 2-hp. motor.

In the set-up at Phenix City the first classifier is a 4-ft. cone, the second an 8-ft. cone and the third a 4-ft. cone above which is mounted an 18-ft. bowl. The flow diagram shows how these three are mounted. It will be noted that ahead of the first Wood cone is a "splitter valve." This is a company-made device and consists of a horizontal vane that is mounted in the in-coming launder ahead of the cone in such a fashion that a coarse and a fine fraction can be made. The separation is based on the coarse sand being at the bottom horizon of the launder and the fine sand in the upper horizons. The end of the horizontal vane that faces the stream of pulp is provided with a small handwheel for adjusting the height of the vane.

The classifiers are mounted in a steel structure so that the sand as produced can fall directly to the cars being loaded. As the sand falls into the car it passes through a four-valve arrangement that helps prevent segregation of the sand. The plant loads 16 cars per 8 hr. of the type sand wanted at Jim Woodruff dam; however, if just ordinary sand was wanted the units can turn out 150 t.p.h.

The deposit being processed at Phenix City runs high in sand and over wide areas varies from practically all sand to material that is roughly 30 percent gravel and 70 percent sand. The gravel is small in size. A new 150-hp. electric 8-in. Amaso dredge pump was installed for this job and it pumps direct to the new plant. That portion of the sand rejected by the

(Continued on page 188)



Members and guests of the Southern California Rock Products Association and the Southern California Roady Mixed Concrete Association at a dinner given in honor of Vincent P. Ahearn, at the Biltmore Hotel, Los Angeles, Calif., on Sept.mber 12, 1951

Major Capital Additions

NATIONAL READY MIXED CONCRETE ASSOCIATION has issued a list of effective procedures to follow in submitting applications for rating assistance to expedite delivery of major capital additions costing \$750 or less, which are covered under C.M.P. Regulation 5. The following points were listed:

1. No particular form should be used; a letter, in triplicate, citing all relevant facts is sufficient.

 Letters should be addressed to Delmar G. Runner, Ruilding Materials Division, National Production Authority, Old General Accounting Office Building, Washington 25, D. C.

3. The following should be submitted: the name of the company's supplier, the order number and its date; type and description of the equipment and its value; the delivery date expected with and without rating assistance; the supplier's reason, stated in writing, for not making the delivery without a rating to expedite delivery.

4. Since the equipment usually sought involves the use of materials which are critically short and, since there are many applications for the equipment, reasons must be given why the company should be granted a rating assistance, and that it is in the interest of the defense program.

5. The defense and essential civilian businesses which are dependent upon the company should be described. Letters written by the company's customers, certifying their dependence upon the company and describing their own essential activities, if attached to the application, would be helpful to N.P.A. in getting perspective on the worthiness of the company's case.

6. Major capital additions to replace worn-out equipment stands on a better footing than major additions designed for expansion purposes. This point should be discussed thoroughly, and an idea of the amount of production, comparing, perhaps, the first and second quarters of 1950 and 1951, should be given.

It was also stated that since manufacturers of construction machinery

Southern California Associations Honor N.S.G.A. and N.R.M.C.A. Secretary

THE SOUTHERN CALIFORNIA Rock Products Association and the Southern California Ready Mixed Concrete Association held a dinner September 12, 1951, in Los Angeles, Calif., in honor of Vincent P. Ahearn, executive secretary of the National Sand and Gravel Association and the National Ready Mixed Concrete Association. Approximately 157 were in attendance, which included representatives from the rock, sand and gravel and ready-mixed concrete industries of California, and out-of-state visitors.

Mr. Ahearn spoke briefly on general

subjects of national interest and significance. He called attention to ronulation trends and some of the probable effects on the growth of indus'ry. He also felt that when the present emergency ended construction would reach a new high. He believed that rock products industries flourished better during times of private financing of construction as compared with periods of government financing. He also sounded a note of alarm about the depletion of our national resources, which means greater imports and a greater merchant marine.

are permitted, under N.P.A. Order M-43, to reserve 50 percent of their production for unrated orders, this should be discussed with the company's supplier. The company should inquire of the supplier why he cannot ship equipment out of his reserve of 50 percent of production for unrated orders.

Ytong Plants for U. S.?

YTONG, WHICH FORMERLY has been produced almost exclusively in Sweden and Germany, is about to make its American debut. Territorial manufacturing franchise rights for Ytong are being offered to qualified American companies. Ytong is said to offer an answer to the problem of finding a cheap, lightweight building block that will substantially reduce the current high cost of building in the United States.

Ytong had its beginning several years ago when a Swedish architect, Dr. Axel Fricksson, began experiments to find a substitute for cement. Dr. Ericksson studied the Swedish Gota Canal whose shale-lime mortar walls, although built in 1832, are still in perfect condition. Today, Ytong is known throughout Europe as a light, strong, easy-to-work and cheap building block. Raw materials for Ytong consist of low quality oil shale, limestone and coal mine waste.

Among the claims made for Ytong is its great compressive strength

which is said to be 1000 p.s.i. Ytong walls are also claimed to be dry, warm, draftproof and fireproof, do not crack and have good insulating qualities because of their cellularity. It is a light product much resembling a petrified sponge, can be made in suitable dimensions and is claimed to need a minimum of joints which saves mortar and shortens building time. It can be worked like wood—cut, sawed or plugged. Ytong can be used as a building block, for lintels over door and window openings, or for floor slabs, roof slabs and insulating slabs.

Manufacture of Ytong is a patented process. Complete information on American production rights of Ytong may be obtained by writing to American Nayco Corp., N.B.C. Building, Cleveland, Ohio.

Concrete Pipe Contracts

United Concrete Pipe Co., Raldwin, Calif., was recently awarded a \$387,017 contract by Snlt Lake City, Utah, for supplying 2000 ft. of reinforced concrete pipe to carry Deer Creek water to Salt Lake City residents.

The company has also been awarded a \$1,129,185 contract for the construction of 4½ miles of 48-in., steel-reinforced concrete pipe at the Sequoia Aqueduct in East Oakland, Calif.

NEW MACHINERY

Extends Fork Truck Line

TOWMOTOR CORP., Cleveland, Ohio, has announced the addition of five new models to its line of fork trucks. Three of the models, replacing three trucks formerly produced, have solid or cushion tires and a shorter wheelbase for greater maneuverability. The



One of five fork lift trucks

two other models feature pneumatic tires on all wheels. The five new Towmotors and their specifications are: Model 480-P with 48-in, wheelbase and 4000-lb. capacity; Model 390 with 39-in. wheelbase and 3000-lb. capaci-ty; Model 400-P which has a wheel-

base of 40 in. and a capacity of 2000 Model 420, 42-in. wheelbase, 4000-lb. capacity; and Model 460 with a 46-in, wheelbase and a capacity of

Load Inverter Attachment

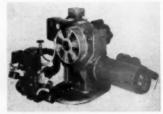
THE BAKER-RAULANG Co., Baker Industrial Truck Division, Cleveland, Ohio, has adapted its load inverter attachment to any operation that requires the regular inverting of palletized loads. The unit consists of a revolving head and a set of top-andbottom forks, with a plywood backstop and a side retaining board. The attachment can be installed on any Baker 3000- or 4000-lb. capacity fork

Concrete Admixture

PACIFIC DESERT PRODUCTS, INC., Los Angeles, Calif., has developed Kwik-Seal, an admixture and curing agent, for use in 4-oz. amounts to each bag of cement. The company reports that Kwik-Seal softens the water and makes pouring and molding possible in extreme temperatures. In addition, it is said, results include greater p.s.i., higher density and flexural strength, less shrinkage, faster curing and better lubrication.

Oil and Gas Burners

CLEAVER-BROOKS Co., Milwaukee, Wis., has introduced its line of five "Hev-E" combination oil and gas burners, for use wherever low-cost gas is sold on an interruptable or curtailable service, thereby necessitating



One of five combination all and gas burners

the use of oil too. The company reports that the burners can be regulated to burn the proper amount of gas or oil for the requirements of a particular installation. On the two larger sizes, the AMG-5 and AMG-7, full modulation between high and low fire is available. The models range from 720,000 maximum B.t.u. gas burned in the AMG-2 size to 8,700,000 maximum B.t.u. gas burned in the AMG-7 size.

Spur-Gear Hoist

COFFING HOIST Co., Danville, Ill., has in production in 1/2- and 1-ton capacities, a spur-gear hoist incorporating new design innovations. The entire unit, including standard length of high-strength coil chain for an 8-ft. lift, weighs 391/2 lb., and may be moved from place to place. Strength and resistance to shock-load breakage are said to be gained by the use of steel plate in the housing in place of cast aluminum alloy. The back plate 1 !aminated to give extra rigidity for su, porting the hoist mechanism, and this plate and all loading parts are constructed of high-tensile steel.



Hoist in 1/2-ton and 1-ton capacities



Whatever your requirements...truck, trailer or semi-trailer BUILDS 'EM ALL!

BULK CEMENT TRANSPORT BODIES

Built for capacity leading payloads . . high spec efficient headling of come-low cost. Eliminate the ax-cial huilt-to-order equipm they're produced by mod line methods — all stend lengths from 9 to 35 feet.

MAXIMUM PAYLOAD! Built of high ten-sile alloy steel for more strength with less weight...more resistance to rust and abrasion. Waterproof leading ports speced for capacity loading. Climbing ledder...self-supporting roof. Electro-walfed thranshat!

Self-Unloading . .

Twin screws give feat action. Special air cells assure quick starting and positive discharge. Driven by engine or powered 5th wheel. All controls conveniently located an outside of body. Simple, positive, immediate, PROMPT DELIVERY—WRITE FOR DETAILS.



BAUGHMAN MANUFACTURING CO., Inc.

1109 Shipman Road

Jerseyville, III.

There is a Baughman Distributor Near You"



What users of Lith-I-Block machines like particularly about them is the fact that they produce . . . day after day — steadily, continually, without loss of time.

They like the open, skyscraper construction — the way it gives them easy access to all parts — the way is lets them make an adjustment or change a mold box in a jiffy . . . without slowing down production.

They find that service is no problem either. They know that parts are no farther away than the next plane departure. There is no costly break in the production cycle.

Yes, constant production. That's what it takes to make money in the block business and that's what Lith-I-Block delivers. As one of the biggest operators in the country said, "Our Lith-IBlock machines were only shut down four days last year . . . and that was due to a cement shortage, not to any fault of the machines."

Get proof of profitable Lith-I-Block performance for yourself, Write for the Lith-I-Block story and the names of nearby Lith-I-Block producers. Learn what Lith-I-Block quality and constant service can do for you.



THE LITH-I-BAR COMPANY

HOLLAND, MICHIGAN

Dept. CP 10



Prestressed Concrete

(Continued from page 178)

opinion of Prof. W. C. Voss, head of M.I.T.'s department of building, engineering and construction.

Professor Voss pointed out that the use of prestressed concrete in this country is still confined mainly to long span, heavy structural members and has not developed sufficiently to make its use as universal as it should be. Cast-in-place construction, he said, requires extensive use of forms and other costly procedure, complicated by the desirability of using very dry mixes or other means of obtaining a dense concrete.

A more economical method, he said, is that of using precast units which can be combined into slabs and beams and prestressed as an assemblage at the site and erected as structural members. Such units can be made to almost any shape from a low water-cement ratio concrete with a lower cement content and prestressed to provide density, aggregate-to-aggregate contact and relatively higher compressive strengths than the same mix sufficiently plastic to be cast. Professor Voss said that tests at M.I.T. showed that a 1-2-4 mix using 4 gal. of water to the sack and compressed under a stress of 2000 p.s.i.

per in. from the wet to the dry state. He proposed that rectangular, prismatic units with proper cores for reinforcement be made from an economical mix and prestressed. These should be designed in such a shape and manner as to allow their assemblage to produce beams, slabs and other members which can be prestressed at higher unit values of compression and which will not lose as much of the residue of compression as normally placed concrete always will.

for 42 hr. and then cured, had a com-

pressive strength of about 6000 p.s.i. and a shrinkage of about 0.00022 in.

Such a procedure, he concluded, would employ existing plants which now manufacture block, eliminate expensive formwork at superstructure height on a job and thereby make prestressed concrete members available for the ordinary structure for which our present procedure is unsuited because of cost.

The high spot of the last day's session was the closing summary by Rear Admiral J. F. Jelley, chief of the Bureau of Yards and Docks, Department of the Navy. Admiral Jelley called the conference especially timely and a milestone on the road to improved construction in America; referred to patented methods and materials as a serious handicap; predicted rapid progress through the use of precast, prestressed units; re-emphasized the need for more research and urged a permanent organization to coordinate research findings.

Admiral Jelley said the Navy had been interested in prestressed concrete for a number of years and referred to a prestressed concrete barge built during the last war which he said was successful and still in excellent condition. He was especially enthusiastic over the possibilities offered by prestressed units made in concrete products plants.

Exhibitors at Conference

Exhibits of materials and equipment used in prestressed concrete construction, with many photographs, were displayed in a corridor of Huntington Hall. Those having exhibits included the Preload Corp., Schorer Corp., John A. Roebling's Sons Co., Nashville Breeko Block and Tile Co., Durastone Flexicore Corp., Plasticrete Corp., Lock Joint Pipe Co., Freyssinet Co. and the Basalt Rock Co. Inc.

High Pressure Steam

(Continued from page 173)

oratory before using, thus insuring a material of uniform and high quality.

All aggregates received at the plant are unloaded on conveyor belts and elevated into overhead storage bins. A traveling weigh batcher is used over the two Besser mixers, which have automatic water meters. A large paved yard is available for outside storage of block.

Steam for the autoclaves is supplied by a 300-hp. gas-fired, fully automatic Kewanee boiler. Each auto-



Aggregates are unloaded under cover and stored under roof

clave is supplied with a Republic pressure recorder so the company has a record of each curing cycle.

The steam boiler plant represents an investment of approximately \$50,-000. The new high pressure steam curing installation represents an investment in the \$250,000 range and is a neat and well-engineered assembly.

B. D. Harter is president and general manager with N. D. Harter vice-president-secretary, also in charge of operation. J. C. Brown is civil engineer and sales manager; E. F. Hubbard, chemical engineer in charge of process control and research.

Concrete Masonry Tests

NATIONAL BUREAU OF STANDARDS, U. S. Department of Commerce, has recently issued two reports dealing with the fire resistance of walls of concrete masonry units. The first report. Building Materials and Structures Report 117, entitled, "Fire Resistance of Walls of Lightweight Aggregate Concrete Masonry Units," deals with walls built from units made from cinder, pumice, expanded slag, or expanded shale aggregates. walls of lightweight concrete masonry units were used in the tests. National Concrete Masonry Association cooperated in manufacturing and supplying the units and in advising on the types and construction details of the test walls. Wall types ranged from 3-in. nonload-bearing partitions to 10-in. loadbearing walls, including some composite walls of brick facing with concrete unit back-up.

The second report (No. 120), deals with walls built of units made with calcareous or siliceous gravel aggregates, and is entitled, "Fire Resistance of Walls of Gravel-Aggregate Concrete Masonry Units." Fire-endurance test results for 12 walls of gravel-aggregate concrete masonry units and hose-stream test results for three of the walls are given in this report.

Both reports tell the types of aggregates used in the concrete masonry units; the proportioning, molding and curing of the units; the construction, size, workmanship, storing and aging of the test walls; methods of testing; results of the tests; and a discussion of the results.

The Building Materials and Structure Reports may be obtained on request from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Concrete Block Plant

CONCRETE BLOCK AND SUPPLY Co., Evansville, Ind., reccuity began operations at its new plant for the production of concrete block. The company will also handle other concrete products, and plans are now in progress for the addition of a ready-mixed concrete department. Officers of the new business include Edwin Krempp, president; Stanley Krempp, vice-president, and Martin Rohleder, Jr., secretary-treasurer. Mr. Rohleder has also been named manager of the firm.

Moves Concrete Plant

NORTHERN CONSTRUCTION CO., Grand Forks, N. D., recently moved its concrete-mixing plant from its present site to a new location north of the Northern Pacific tracks at the west edge of the city. Two large beams were used as runners on which the plant was hauled. The conveyor, cement storage bins and scales were dismantled for moving, but the major part of the plant was transferred intact.



Soberger's Concrete Black Co., Gary, Ind., receatly enlarged their plant by adding two 74' 18" Farquhor Model 346-2 Sectional Trough Conveyors to feed 250-ton storage happer. This plant uses one partable and six permanent Farquhar Conveyors in all. (See quotes from letter, below.)

"We look to FARQUHAR for our CONVEYOR needs!"

Here are quotes from a letter Farquhar recently received from Seberger's Concrete Block Co., Gary, Indiane: "In 1950, we completed 25 years of cement block manufacturing. As our facilities grew, we looked continually to your company to satisfy our conveyor needs. The satisfaction gained since our initial purchase 14 years ago (this first conveyor is still being used to feed our crusher hopper) has been always reaffirmed in subsequent purchases.

"Farquhar Conveyors are ideally suited to our operations, providing high capacity units at reasonable investment and subsequent low maintenance cost. Your service facilities have always been excellent. We certainly recommend Farquhar Conveyors to anyone with a materials handling problem."

THIS MANUFACTURER echoes the sentiments of thousands of builders, manufacturers, coal operators and other industries and businesses who find bulk or package materials handling a problem!

Farquhar offers you a complete line of conveyors for portable semipermanent or permanent use, to handle any and all kinds of losse or packaged materials. There's a Farquhar conveyor that can save you money!

WORLD'S MOST COMPLETE CONVEYOR LINE

WRITE for complete information on Farquhar Conveyors to A. B. FARQUHAR CO., Conveyor Division, Dept. 0-28 142 N. Duke St., York, Pa., or 618 W. Elm St., Chicago 10, 111



HYDRAULIC PRESSES - FARM EQUIPMENT - FOOD PROCESSING AND SPECIAL MACHINERY

yes, you can preserve your capital...

Lease

this Universal

Concrete Pipe

Machine



I OU needn't lay out the purchase price to begin enjoying the production and profits of this great machine. Leasing arrangements are possible on terms that assure profitable operation. The Universal Pipe Machine has set new higher standards for efficiency. It makes more pipe and better pipe with fewer man hours. Because it true-tamps at the incredible rate of 680 strokes-aminute, you use a drier mix, get stronger pipe that handles with less damage, requires minimum curing. One of the four sizes (5"-21", 6"-48", 12"-60", 24"-72") will meet your requirements. Ask about the Universal Lease Plan.

UNIVERSAL CONCRETE MACHINERY CO. 297 South High Street Columbus, Ohio

Jim Woodruff Dam

(Continued from page 182)

Wood classifiers is an excellent masonry sand and is sold locally for that purpose.

Performance Data

Performance data on the classifiers are as follows:

Screen Analysis No. 1

This is a typical analysis of the sand as dredged to the plant. (See flow diagram).

flow	diagram).	
Mesh		Passing, percent
4		99.5
8		95.5
16		82.0
30		55.0
50		14.0
100		8.5
	Secretary American	in Mar 9

Screen analysis No. 2 is the overflow of the 48-in. Wood classifier and is as follows:

is as follows:	
Mesh	Passing, percen
4	100
8	All but a trace
16	99.0
30	79.0
50	13.0
100	7.5

Screen Analysis No. 3

Analysis of the coarse fraction from the 4-ft. cone is represented as follows:

OHOWS:		
lesh	Pi	assing, per
4		99.0
8		89.5
16		60.0
30		210
59		4.5
50		1.0
	Screen Analysis No.	

Screen analysis No. 4 is the oversize from the 8-ft. cone and is as follows:

lows:	
Mesh	Passing, percer
4	100
8	99.0
16	91.0
30	56.0
50	18.0
100	3.0
	Screen Analysis No. 5

The overflow of the 8-ft, cone has

the following a	screen characteristics.
Mesh	Passing, percent
-4	100
8	100
16	All but a trace
30	99.5
59	73.0
100	96.5

Screen Analysis No. 6
The coarse fraction from the 18-ft.

bowl	18	8.8	follows:	
Mosh				Passing, percen
+4				99.5
8				87
16				64
30				42
50				20
100				
			Second Amplusia	Ma 7

Screen analysis No. 7 is representative of a car sample.

Mesh	Passing, percent
±4	99.0
8	91.0
16	75.0
30	52.0
50	22.0
100	6.0

The company has a second 400-hp. Amsco dredge with a 125-hp. re-pump dredge as part of the older sand and gravel operations. Another 125-hp. diesel pump dredge is contemplated for the near future.

The offices of Consolidated Gravel Co., Inc., are in Columbus, Ga. The



HOPPER HEADACHES

When

production slows because materials in hoppers hang ap and arch . . .

When

your men are tired and slow from hammering and poking clogged hoppers . . .

When

replacement costs are high because of sledging damage . . .

. . . apply low cost "BRANFORD" pnoumatic vibrators and end all this.



"mantono" four Holt Side Mounting Vibrator on a Conical Sand Bin.

"BRANFORD" Vibrators

- Instant Starting
- Eronomy of operation—low air consumption
- Only one moving part, hard chrome plated piston
- Henry Foot-Pound Impact and High Frequency
- Durable ALL STEEL construction
- Parts precision machined and hardened where required

Vibrator styles available for concrete pipe, burial vault, tank and building unit forms; and many other uses.

Catalogue furnished on request.



company also manufactures concrete pipe in sizes from 4 through 60 in. J. P. Calhoun is president of the company and C. W. Guthrie is engineer and general superintendent.

Effects of Shortages on Pipe Industry

"AN ALMOST CHAOTIC CONDITION exists in the matter of steel and cement shortages, and it will get much worse before it gets better," is the prediction of the American Concrete Pipe Association. A.C.P.A. further stated that there will be many cases of extreme hardship, even going as far as plants shut down for want of steel and/or cement during the next few months. However, in the fourth quarter of this year, when CMP should be functioning smoothly, it is thought that everybody should be getting materials probably on a certain percentage of what they obtained in some previous base period.

Wire mesh has been classified as a "B" product on the grounds that it is a fabricated product as opposed to a basic steel mill product. CMP will issue rated orders for mesh, which the steel companies may or may not honor, on the basis of their require-ments in accepting DO rated orders under existing N.P.A. regulations; and CMP will also tell the producer how much steel, other than wire mesh, that he may receive. American Concrete Pipe Association has suggested to its members that any company which is unable to place a rated order for iron or steel, due to a supplier having already accepted his maximum percentage, should apply to National Production Authority, Iron and Steel Division, Reference: M-1. In this communication, the producers who refused to accept the order should be

A producer, in order to get his allocation of steel and rated orders for mesh, should submit CMP-4B to Washington without delay. Since wire mesh is now classified as a "B" product, it should be listed separately from other steel requirements, when submitting the report. If this was not done by those who have already submitted reports, a supplementary report, so labeled and referring to the applicable CMP number, should be sent.

Concrete Block Plant

MORTON CONCRETE BLOCK Co., Lawrence, Kan., recently began production at its new concrete block plant which will produce 2000 concrete block per day. Plant facilities include five steam rooms. The company also produces pumice block.

Three sizes of concrete block are produced, the newest of which is the 4-in. high unit which gives the effect of Roman brick construction to the exterior of a house. The company is owned and operated by Clark Morton, Sr., and his two sons, Walter Morton and Clark Morton, Jr.

BASIC FACTS ABOUT MODERN MATERIALS HANDLING

HOW IT WORKS - WHAT IT DOES-WHAT IT SAVES

Study of major importance to business and industry is made available by CLARK

A practical, profitable way to produce more goods with the same amount of human effort, is presented simply and graphically in a new booklet offered by the Industrial Truck Division of the Clark Equipment Company, of Battle Creek, Michigan.

This booklet points up technological advances in materials handling operations that are effecting extraordinary benefits for industry—such as faster production, increased economy and efficiency, improved human relations, lower accident and damage rates, quickened distribution and substantial cash savings. Simply and directly it describes tested and

proved means to help speed up and perfect the imperative integration of a military and a civilian economy

2-BILLION SAVING POSSIBLE

Concretely, this study points up a quick and certain way for Industry to save some \$2,000,000,000" annually at a time when the country, faced with a rearmament program of 50 billions a year for at least three years, is in desperate need of every possible mechanical aid to save time and speed production. Many advantages in other directions, not reckoned in dollars and cents, will be recognized at once by every reader

This new CLARK study is neither fancy nor complex. It is a well-illustrated, simply-written exposition of the sound and sensible fundamentals on which modern materials handling techniques and practices are based. It describes ways and means of getting the most out of fork-lift trucks, powered hand trucks and industrial towing tractors, at the least possible cost. For the many businesses which have not yet adopted modern handling methods and machines, the booklet will be found invaluable. For the thousands of progressive businesses already employing modern methods and machines, it is just as valuable as a check against omissions, abuses and opportunities for full achievement of production goals and potentials.

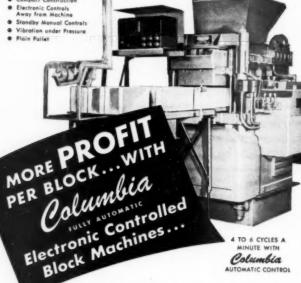
SEND FOR YOUR COPY

To get a copy of "Basic Facts About Materials Handling" fill out the coupon, attach it to your business letterhead and mail it to the Clark Equipment Company, Industrial Truck Division, Battle Creek, Michigan. If you want additional copies for key personnel, they are available in reasonable quantities.

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	*Materials Handling Case Book; McGraw-Hill Book Co., Inc. 1951	
CLAR AND POWERED HAND	K FORK TRUCKS TRUCKS - INDUSTRIAL TOWING TRACTORS	
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- · Stondby Manual Controls
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LOW COST initial investment backed with low cost maintenance and rugged dependable construction means a wider margin of profit for the operator. Fully automatic with elec-nic controlled valves offers a flexible operation obtained in no other machine. Compare Columbia feature for feature ... you'll buy Columbia!

Look at these features:

Electronic controls. ... away from vibration yet within easy reach of the offbearer. • Rugged, dependable plain pallet machine. • Electronic controlled valves afford unheard of flexibility. • Finger tip controls allow 4 to 6 cycles per minute. • If necessary, manual operation instantly available. • Vibration under pressure with electronic controlled oscillation and timing of the feed draws. • Blocks ahead of any machine of comparable feed drawer.

Blocks ahead of any machine of comparable production capacity!

Approved and proven by successful operators throughout the country!

Write home office for name and address of sales representative in your area.

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AUTOMATIC CONTROL

FORUM

CONCRETE PRODUCTS

Question

We have been told that if we use high pressure steam for curing our block instead of low pressure steam. we get quicker and better results. If this is so, what is the reason? Answer

The use of high pressure steam in place of commonly used low pressure steam actually gets quicker results and generally produces a more attractively colored block. Low pressure steam is steam at 10 p.s.i. pressure or less, and high pressure steam is steam from 100 to 125 p.s.i. pressure. Steam at 10 p.s.i. has a temperature of approximately 220 deg. F., whereas steam at 100 to 125 p.s.i. has a temperature of 340 deg. F., practically an additional 120 deg. of heat inten-

Since heat is transmitted from steam to block in two ways-radiation and conduction-this additional heat energy of 120 deg. creates a more rapid heat transfer. In the case of heat transfer through radiation (as in the case of our sun), the additional temperature creates the same heat transfer in half the time required with low pressure steam. In heat transfer through conductance, where steam comes into contact with the block the greater temperature forces heat penetration in direct proportion to the temperature differential.

With low pressure steam, as the block come up to heat, it becomes increasingly difficult to raise the temperature towards the end of the heating cycle, and in consequence more steam is required during the end of the cycle to raise the block temperature a few additional degrees than would be required by high temperature steam where the temperature difference is so much greater.

A byproduct reaction between the extra hot steam and the cement paste is the greater lightening in color of block cured with high pressure steam. It is similar in effect to the color achieved in high pressure autoclave steam curing. It is many shades lighter than the color achieved with low pressure steam. And to those who cure their block in moist air, the block appear dull in color. In many instances of steam curing where steam supply is inadequate, cinder block appear black and sand and gravel block appear dull gray. The use of high pressure steam is beneficial in all ways for curing masonry units. Actually less steam is required and kilns are not so wet from condensed water.

Completes Ready-Mix Plant

Crowe-Gulde Cement Co., Amarillo, Texas, recently announced the completion of its new ready-mixed concrete plant. The company, which began operations in 1926, started as a builders supply company. In 1930, it added a ready-mixed concrete plant, using three mixer trucks. The company now has a fleet of 21 mixer trucks and presently is leasing 25 additional trucks to aid its work at Amarillo Air Force Base. Approximately 625 cu. yd. of concrete are produced each day.

Another division of the company, which was added in 1940, produces Haydite block which are made in 50 different sizes.

New Offices

FLORIDA CONCRETE PIPE Co., an affiliate of Universal Concrete Pipe Co., has moved to new offices in the Center Building at 330 S. Adams St., Tallahassee, Fla. The company manufactures a complete line of concrete sewer pipe and culvert, ranging from 6 in. to 120 in. diameter. Reinforced pipe are made from sizes of 12 in. and up. Among other items handled are reinforced flat-base concrete pipe, railway markers, open and closed-face concrete cribbing and concrete septic tanks. John A. Harris is district manager.

N.C.M.A. Issues Booklet On Fire Resistance of Concrete Masonry Units

NATIONAL CONCRETE MASONRY AS-SOCIATION has recently transmitted to member firms a booklet published by the National Bureau of Standards giving results of fire endurance and hose stream tests of 16 walls of lightweight concrete masonry units.

The investigation was started prior to the late war under the program of research on building materials and structures at the National Bureau of Standards. The National Concrete Masonry Association cooperated in manufacturing and supplying the lightweight concrete units and in advising on the types of construction details of the test walls.

The aggregates used in the manufacture of units were cinders, expanded shale, pumice and expanded walls including some composite walls of brick facing with concrete unit back

Results summarized in the booklet show that indicated fire resistance of the different constructions varied with the thickness of the wall, moisture content at the time of the test, the kind of aggregate, the cell area of the units and the wall finish. The report makes available additional authoritative evidence of the fire resistant properties of walls built of lightweight concrete masonry units.



HELTZEL

STEEL FORM & IRON CO.
WARREN, OHIO

NOTHING ELSE LIKE IT

compare M & M ENGINEERING'S SERVICE

with any OTHER SERVICE

NO other service gives

UNIFORM HEIGHT - More Sales

UNIFORM DENSITY - Less Aggregate

1020 Blocks per hour - More Profits

on a Besser Vibro Pac Block Machine. \$ for \$ It's the BEST BUY in the Block Industry.

Phone or Write



GINEERING CORP.

INDIANAPOLIS 5, IND.

CONSIDER THESE ADVANTAGES **Never Before Combined in Any Mixer!**



A massive mixer with output capacity to "pace" the largest block machines.

Continuous feeding, mixing and discharging.

Mixing period variable from 5 to 10 minutes or more.

Automatic action. Just set it-start it and leave it.

Provides wetting of aggregate-before and during mix-

Adaptable to all mixes including the popular light aggre-

Furnished, if desired, with hoppers to feed up to 4 aggregates.

Tremendous output with economy of manpower, electricity and upkeep.

COMPARABLE performance for medium and smaller plants is available in other KENT MIXERS. Write for the

facts today.

THE KENT MACHINE COMPANY

CUYAHOGA FALLS, OHIO

Concrete Machinery Since 1925

The KENT



the COUNTER-ACTIVE
WEIGHT DISTRIBUTION of

GERLINGER LIFT TRUCKS!

In the concrete field especialty — where continual changes in lead widths and weights are a common transportation problem — Gerlinger Lift Trucks have consistently outperformed other material handlers. Most important reason for this leadership is the nearly verse weight distribution of the Gerlinger.

even weight distribution of the Gerlinger. When unloaded, 54% of the lift truck weight remains over the front wheels of the Gerlinger. This unusual balanced weight distribution — on exclusive Gerlinger feature — allews the driving wheels to obtain top traction and braking power under changing load weights and sizes.

It's just one of many job-proven features that make Gerlinger Lift Trucks first choice in concrete products plants where off-size loads have to be moved and stored.



© Gerlinger's exclusive Counter-Active Weight Distribution is graphically shown here in compenson with the excessive counter weight of other lift trucks. This nearly even weight distribution assures comple braking power at all times, longer lire life, less frame strain and the maximum steering and operating ease



GERLINGER CARRIER CO., DALLAS, OREGON

how white is white?

Use Trinity White—the whitest white cement. Trinity White is a true portland cement. It meets all Federal and ASTM specifications. Sell Trinity White for architectural concrete units, terrazzo, stucco, paint, ornamental work, tilesetting, etc. When ordering ask for it by its full name Trinity White—it's widely advertised to your trade. Trinity Division, General Portland Cement Co., 111 W. Monroe St., Chicago; Republic Bank Bldg., Dallas; 816 W. 5th St., Los Angeles.

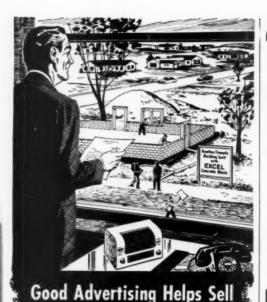
Irinity
White

PORTLAND CEMENT

steed was whiter than
a sheeted ghost

-Anon

CONCRETE PRODUCTS, October, 1951
A Section of ROCK PRODUCTS



CONCRETE MASONRY s EVERY successful businessman knows, making a quality product is not enough. Your

product must be sold. Buyers must be convinced

that your product is what they need. The way to do that is to tell them why they should buy your product rather than others. That is the function of advertising. Advertising

reaches the most people most economically.

Advertising may be a radio commercial, a newspaper ad, a listing in the classified directory of the phone book, a job-site sign, a television show, a demonstration house, a direct mail piece or a truck sign. Which one or combination of these or other kinds of advertising you use depends on their availability, your market and your budget. Used consistently, advertising builds preference and acceptance for your product.

Backed by personal selling to clinch the sale, advertising is another effective tool for building greater block sales in a business founded on the fundamentals of (1) making block that comply with ASTM or Federal specifications for dryness, strength and absorption, (2) showing quality concrete masonry buildings to prospects and (3) furnishing prospects names of architects and builders who can be depended upon to design and build quality concrete masonry structures.

PORTLAND CEMENT ASSOCIATION

33 W. Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete...through scientific research and engineering field work

Meeting Load Limitations with High Capacity at LOW COST!



Carries up to 3 cu. yds. of mixed concrete on a single axle truck . . . and not exceed the single axle weight limitation of 18,000 pounds which prevails in many states.

NEW BULLETIN MAILED ON REQUEST

4987 FYLER AVE. . ST. LOUIS 9, MO.

Serving the CONCRETE-INDUSTRY 20 YEARS

SELL MORE BLOCK ON EVERY JOB!



Furnish VIBRAPAC SOFFIT BLOCK for ALL FLOORS and ROOFS



Permanent, Fireproof Floors and Roofs. Low initial cost and maintenance. Natural base for radiant heat installations. Provide surface of maximum acconstical and insulation value Can be plastered, or exposed, makes a ceiling of beautiful pattern and to

Soffit Block are supported in place with temporary adjustable steel centers while reinforced concrete slab is placed and cured. This elimi-nates timber shoring and leaves space below clear during construction.

BESSER VIBRAPAC PRODUCES SOFFIT FLOOR AND ROOF UNITS

The same machine that produces high quality concrete masonry units in all style and sizes, using Plain Pallets. Conti-uous, full capacity operation. Fully aut nits in all styles matic. No machine operator required.



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Complete Equipment for Concrete Products Plants

MULTI-BLADE MIXERS

Faster - Better - LOWER COST Mixing

"Super Action" blade arrangement gives these "super" results! Unlike the two conventional spiral blades, which push the mix one way along their entire length, Multiplex' ten paddle shaped blades push the mix in opposing directions. This cutting, turning, and kneading produces thorough mixing in shorter time, at less cost. Liner wear is reduced, as the mix is churned against itself.

Around these "super action" paddles Multiplex builds a solid, dependable mixer with all the common sense advantages of: convenient charging height, discharge door control in front, anti-friction bearings, and wearresistant, replaceable liners and blades.

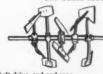


V-belt drive, rear discharge, 18-cubic foot cap

Many Multi-Blade Mixers, in standard sizes from 3 to 60 cubic feet, are in stock for immediate delivery. All models may be had mounted on rubber tired steel trucks. Discharge door may be in the rear, either end, or bottom, or in more than one location, as desired.

Special Mixers are made to suit your special requirements. During our 40 years of successful mixer design and manufacture we have produced mixers as large as 600 cubic foot capacity.





V-belt drive, end and rear discharge. 60-cubic foot capacity

To profitably operate any mixer, it must fit your needs and facilities. Multiplex engineers can help you plan your plant expansion. We can supply the superior mixers, fully automatic block machines, vertical and inclined skip hoists, and the compartment aggregate bins required for successful plant operation.

MULTIPLEX Machinery Corporation • Elmore, Ohio

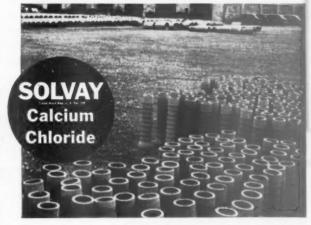
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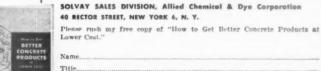
With the addition of Solvay Calcium Chloride, good concrete products can be made better, faster, at lower cost. You'll find that Solvay Calcium Chloride helps improve the quality of your products. enables you to strip forms in half the time, gives protection against low temperatures and offers such other advantages as:

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For more complete details, send for your free copy of "How to Get Better Concrete Products at Lower Cost." This informative book contains complete information on the use of Solvny Calcium Chloride in cast concrete products. For your copy, simply fill in and mail coupon today.





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Greater Vibration Noiseless Operation Minimum Maintenance Longer Life

Cannon 2" Style EM "Quiet-Type", Heavy Duty Vibrator with long stroke.

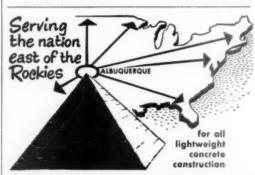
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For better, more dependable pneumatic vibration, try Cannon Vibrators. Available in 1¼" to 4" piston sizes, they range in weight from 9 to 140 lbs. Satisfactory performance is guaranteed. Send for complete information today!

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SKYSCRAPERS — WAREHOUSES
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CHECK THESE ADVANTAGES

ECONOMY • PERMANENCE • FIRE RESISTANCE • BEAUTY
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Complete Concrete Plant Immediately Available Purchased New April 1951 - Used Only on One Job Entire Plant will be sold to the highest bidder

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HITZET BATCHING PLANT — complete including WC3004 bin, one cement compartment aptrox. 311-bbl caracity and 3 agreequte compartments, 75 tons each; 2-yd, combination betcher with b'n outlet and a 10,000 lb x 2 lb graduation scale, drop weight; collecting hopper under batcher; struct, steel support to accommo-

Please submit your bid in triplicate to:

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2—.

SMITH TILTING MIXERS — 56-S Model 431 complete with front end charging chute, au tilt, 6" discharge extension, electric batch meter and discharge lock, discharge chute, support frame, equipped with 30 hp AC 3-bhase, 60-cycle, 220/440-volt, solash-root moor, including automatic reduced voltage starter 220 volt with start-and-stop pushbutton. Serial Nos. of mixes — 59001, 59002. "S19,750.00

REX 200 DOUBLE PUMPCRETE — Powered by 50-hp, 3-phase, 60-cycle, 440-voll, electric motor with starter, drum control, with grids and disconnect switch, overhed of platform and control is mounted on skids with selective drive transmission, pupmill rem'rar powered by 7½-hp, 3-phase, 60-cycle, 440-volt electric motor with controls, auxiliary equioment consisting of: va've compound, grease gun and hose, in 'et water valve assembly, decharge weter valve assembly, washout hose assembly, shutoff va've, adapter, go-devil assembly, washout horse assembly, shutoff va've, adapter, go-devil assembly, od-evil intry tube, is mese, discharge water manifold, go-devil of the control of the

INSPECTION MAY BE MADE at Zuq Island, Mich., by contacting I. W. Henderson, Raymond Concrete Pile Co., 54 Emaine at Haltiner Street, River Rouge, Mich. Phone: Vinewcod 1-5500.

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Both McCracken Type and Martin Trawelers-PROVED to last as long or langer - yet sust considerably less.

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1—Go-Corp Crown Prince, 2-unit plain pulls thock machine; with 8" regular attachment, including corners, sash and fractionals, Also 12" regular attachment including corner and sash. Attachment for (4) 4"xx"(1)" salar size of the first of t

pacity.
Above equipment may be seen in op-Reason for selling, installing larger equipment.

WILLSON BROS Rives Junction Phone 23-F-13

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One (1) 4 yd. SMITH III-Dump Mixer—Good Shape, Too full for our plant.—The first \$1000.00 buys it.

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SPACE HEATERS War Surplus Bargain New-Ready To Use!

40,000 BTU capacity

Burning gasoline, kerosene or diesel fuel.
 Electric blower – 12 V. DC or 110 V. AC using small transformer, furnished with heater.

Portable, Quick, Clean Heat

Ideal for curing room, concrete plants, work under construction, emergency heat, or auxiliary iary heaters.

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100,000 Pressed Steel, Aluminum and Cast Iron Palleta

In Stock

Size	Kind	Price	
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3"	Steel	32c	0.0
4"	Steel	3×c	20
4"	Aluminum	38c	99
4"	FC George Welded	25c	0.0
6"	Steel	49c	0.0
8"	Steel	52c	22
8"	FC George Welded	35c	99
8"	Aluminum	52c	0.0
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10"	Steel	65c	99
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- Feet, each\$165.00 8-#7 & #9 Mold Boxes, various sizes, each\$300.00
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MISCELLANEOUS

60-Steel Chase Racks, 72 Block Capacity. Each\$15.00

WE BUY COMPLETE CONCRETE BLOCK PLANTS

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These mixer bodies, in excellent operating condition, are mounted on International Trucks.

Can furnish reliable, experienced drivers. Will also include a new additional mixer if de-

Unfavorable seasonal operating conditions make equipment available.

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STOP that WATER

With FORMULA NO. 640
A clear liquid—7 d'firent resins in a solvent which
prestrates ("or more into concrete, concrete blacks
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ANTWES PRODUCTS CO., CMANA 3, NESR

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1-Stearns 15 Concrete Block Machine with pallet return, feed box, mold boxes and attachments.

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FOR SALE-One Stearns Clipper with attachment and pallets to make 1250 7%" z 15%" blocks. Excellant condition. See it in McPherson, Kansas, operating. Low price. One Steams Clipper with 8" and 4" attachments. Now operating in Ottumwa, fows. Priced to sell. Also have No. 7 and No. 9 Jolterete equipment. Contact Phil Oram, 4118 West 74th Terrace, Mission, Kansas, Phone Gilmore 9780.

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Write for full information TEXAS FOUNDRIES

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-Stearns Model A, Cilipper Stripper
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40 Steel Racks, 72 block capacity, for
plain pallets 18x18, Excellent condition,

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A complete operating plant is discontinuous block
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original cost. Available after Sectionary 15, 1821,
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90% of this fleet 1949-1950 and 1951 models

LF and LJ 10 wheel Mack Trucks. Mixers are

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In Western thin, with Gravel Plant Size—New Lith-Hibber machine: Truchman Lift Truck, stearns mixer; Beiler and Curing room. R. B. Light in operation, good market. Owner has other interests; hisks business is a thriving full time busines. In Icol CRETT PRODUCTS, 369 W. Jackton Stat., Chicago 6, Ill.

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CONCRETE PRODUCTS COMPANY

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WANTED

Assistant Manager, Concrete Products Plant equipped with Besser, Hilinois location.

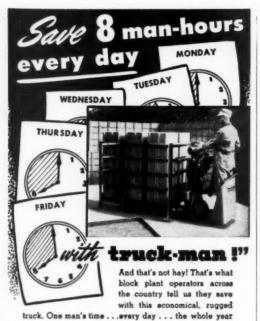
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Truck-Man is a light, speedy, highly maneuverable truck that works a shift on little more than a gallon of gas... requires minimum maintenance... has simple controls any worker quickly learns to operate. The special 62" platform handles even 72 block racks... those extra big loads that mean more profit per trip between block machine and curing room. Various platform heights, widths and lengths available to suit your operation.

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"... and Joe, look at the smooth, straight edges on that material - they're perfect! The finished job looks better, costs less and can now be completed in record time."

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The outstanding policy of "FREE TRIAL" has been in effect since Clipper invented the world's first Masonry Saw many years agol Only through this Clipper "FREE TRIAL" are

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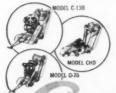




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CONCRETE PRODUCTS, October, 1951
A Section of ROCK PRODUCTS

a combination that's hard to beat

High Pressure Kiln being loaded with blocks to be cured.

J&C BRICK PRESS

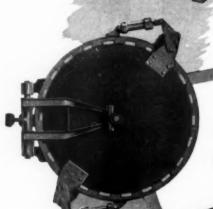
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- .. produce up to 14,000 perfect concrete or sand lime brick per 8 hour shift
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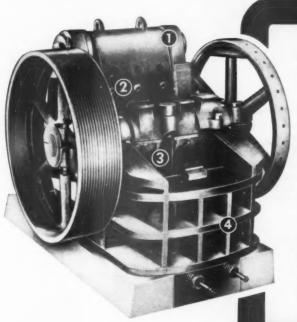
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50 years experience with bulk handling

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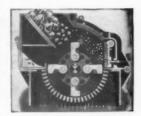
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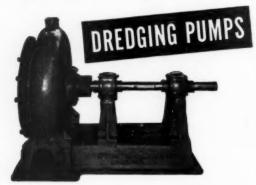
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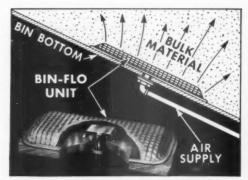
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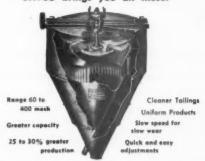
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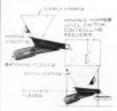
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